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and Biology
A Continuing
Bibliography
with Indexes

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ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

STAR (N-10000 Series)	N83-23267 - N83-25650
IAA (A-10000 Series)	A83-29978 - A83-33484

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NASA SP-7011(248)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 248)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in July 1983 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

NASA Scientific and Technical Information Branch 1983
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This supplement is available as NTISUB/123/093 from the National Technical Information Service (NTIS), Springfield, Virginia 22161 at the price of $7.00 domestic; $14.00 foreign.

INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 364 reports, articles and other documents announced during July 1983 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA).* The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

Six indexes -- subject, personal author, corporate source, contract, report number, and accession number -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1983 Supplements.

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All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies of accessions are available at $8.00 per document. Microfiche[1] of documents announced in *IAA* are available at the rate of $4.00 per microfiche on demand, and at the rate of $1.35 per microfiche for standing orders for all *IAA* microfiche.

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TABLE OF CONTENTS

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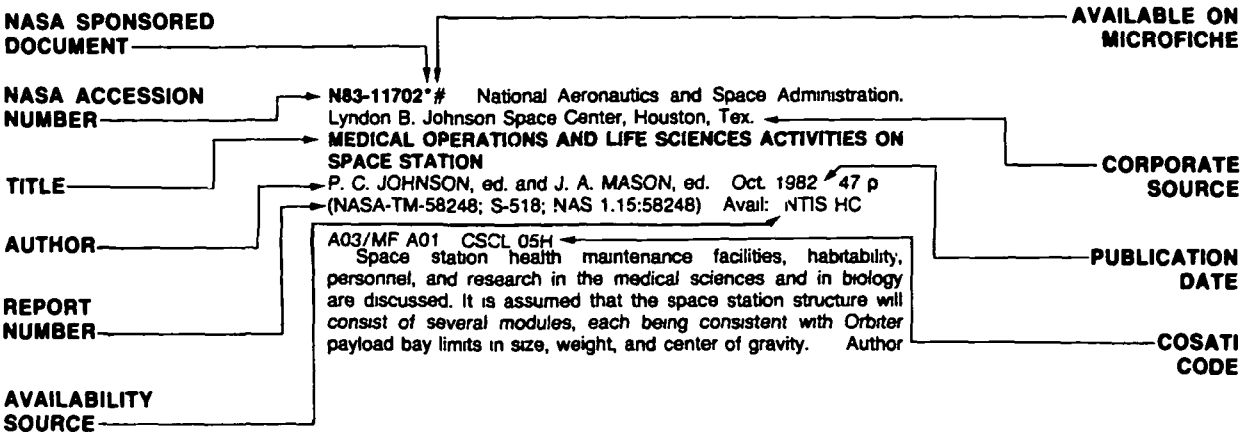

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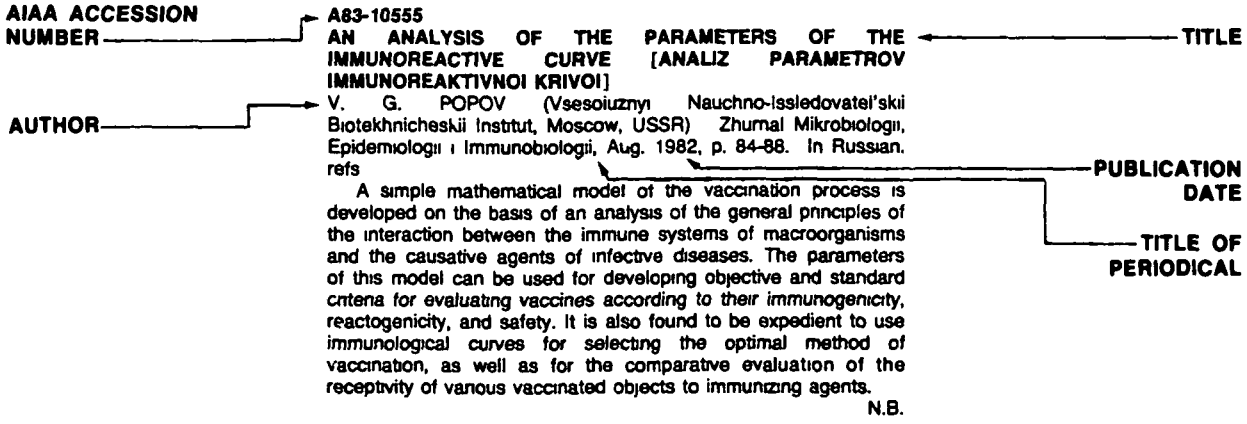

AEROSPACE MEDICINE AND BIOLOGY

(A Continuing Bibliography (Suppl. 248)

AUGUST 1983

51

LIFE SCIENCES (GENERAL)

Includes genetics.

A83-30022* Michigan Univ., Ann Arbor
INTERRELATED STRIATED ELEMENTS IN VESTIBULAR HAIR CELLS OF THE RAT
M. D. ROSS and C BOURNE (Michigan, University, Ann Arbor, MI) Science (ISSN 0036-8075), vol. 220, May 6, 1983, p 622-624 refs
(Contract NSG-9047, NAS2-10535)

A series of interrelated striated organelles in types I and II vestibular hair cells of the rat which appear to be less developed in cochlear hair cells have been revealed by unusual fixation procedures, suggesting that contractile elements may play a role in sensory transduction in the inner ear, especially in the vestibular system Included in the series of interrelated striated elements are the cuticular plate and its basal attachments to the hair cell margins, the connections of the strut array of the kinociliary basal body to the cuticular plate, and striated organelles associated with the plasma membrane and extending below the apical junctional complexes. O.C.

A83-30140
EVOLUTION OF SLEEP: STAGES OF THE FORMATION OF THE 'WAKEFULNESS-SLEEP' CYCLE IN VERTEBRATES
I. G. KARMANOVA (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) (Evoliutsiia sna. Etapy formirovaniia tsikla 'bodrstvovanie-son' v riadu pozvonochnykh, Leningrad, Izdatel'stvo Nauka, 1977) Basel, S Karger AG, 1982, 175 p. Translation. refs

Previously cited in issue 21, p. 3856, Accession no. A78-48524

A83-30301
AFFERENT ACTIVITY IN THE CARDIAC BRANCHES OF VAGUS NERVES AFTER INTRACORONARY AND INTRAVENOUS ADMINISTRATION OF ANTICARDIAC CYTOTOXIC SERUM [AFFERENTNAIA IMPUL'SATSIIA V SERDECHNYKH VETVIAKH BLUZHDAIUSHCHIKH NERVOV PRI VNUTRIKORONARNOM I VNUTRIVENNOM VVEDENII ANTIKARDIAL'NOI TSITOTOKSICHESKOI SYVOROTKI]
V. B. PAVLIUCHENKO and I. E. BURIAKOV (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 29, Mar.-Apr. 1983, p. 186-191. In Russian. refs

A83-30303
THE CHARACTERISTICS, NEURONAL MECHANISMS, AND FUNCTIONAL SIGNIFICANCE OF CORTICAL INHIBITION [KHARAKTERISTIKA, NEIRONNYE MEKHANIZMY I FUNKTSIONAL'NOE ZNACHENIE KORKOVOGO TORMOZHENIIA]
F. N SERKOV (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 29, Mar.-Apr. 1983, p. 207-215. In Russian refs

A review is presented of the major results obtained during investigations of the properties and neuronal mechanisms of the inhibition process in the neurons of the cerebral cortex Topics examined include studies of the effect of various afferent stimulations on the impulse background activity of neurons, studies of the patterns of the development and the continuation of the inhibition process in cortical neurons using paired stimulations, and studies of the synaptic processes in the neurons of the cerebral cortex using the intracellular lead of potentials method. Also discussed are the spatial distribution of exciting and inhibiting neurons in the cerebral cortex, the role of specialized inhibiting neurons in the genesis of cortical inhibitions, studies of the reactions of the neurons of the auditory cortex to the stimulation of th geniculate-cortical fibers, studies of the reactions of cortical neurons to the direct stimulation of the cerebral cortex, and the nature of the mediator of cortical inhibitions N.B.

A83-30304
THE ROLE OF THE MIDDLE HYPOTHALAMUS STRUCTURES IN THE REGULATION OF THE GLUCOSE CONTENT IN THE BLOOD AND THE GLYCOGEN CONTENT IN THE LIVER [O ROLI STRUKTUR SREDNEGO GIPOTALAMUSA V REGULIATSII SODREZHANIIA GLIUKOZY V KROVI I GLIKOGENA V PECHENI]
V. D. SOKUR and V I. ROIK (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 29, Mar.-Apr 1983, p 224-226. In Russian. refs

A83-30305
A DEVICE FOR THE FORMATION AND INVESTIGATION OF SPHERICAL ARTIFICIAL PHOSPHOLIPID MEMBRANES [USTROISTVO DLIA FORMIROVANIIA I ISSLEDOVANIIA SFERICHESKIKH ISSKUSSTVENNYKH FOSFOLIPIDNYKH MEMBRAN]
B. S. SUSHKO (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 29, Mar.-Apr. 1983, p 239-242. In Russian refs

A device has been developed which can be used to form spherical bilayer artificial phospholipid membranes, and allows the uninterrupted registration of the changes of the concentration of any kind of substance within the sphere at any point on its diameter. This device can be utilized to register substances using the polarographic method on a solid platinum electrode, as well as by flat artificial membrane methods at the opening Results are presented for the use of this device in studying the transport of oxygen across a spherical artificial phospholipid membrane composed of brain phospholipids of large, horned cattle. N B.

A83-30320
CYANO-BACTERIAL SYMBIOSIS - A WELL INTO THE PAST [TSIANO-BAKTERIAL'NYE SOOBSHCHESTVA - KOLODETS V PROSHLOE]
G. A. ZAVARZIN (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR) and I. N. KRYLOV (Akademiia Nauk SSSR, Geologicheskii Institut, Moscow, USSR) Priroda (ISSN 0032-874X), March 1983, p. 59-68 In Russian

The role of the cyano-bacterial film, which covered the oceans in the Precambrian era, in the development of different organisms as well as in the formation of various geological features is examined. The morphological characteristics of present-day and Precambrian cyano-bacterial films are discussed. Attention is focused on the results of controlled laboratory experiments concerning the formation of cyano-bacterial layers and the development of the symbiosis of mineral and bacteria which was involved in the formation of stromatolites. N B

A83-30404
THE EFFECT OF ROUGHNESS ON THE OPTICAL PARAMETERS AND CAPACITANCE OF BILAYER LIPID MEMBRANES [VLIIANIE SHEROKHOVATOSTI NA OPTICHESKIE PARAMETRY I EMKOST' BISLOINYKH LIPIDNYKH MEMBRAN]
V. I PASECHNIK (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 28, Mar.-Apr 1983, p 248-253 In Russian refs

A83-30405
THE INTERACTION OF PLASMA LIPOPROTEINS WITH BILATERAL LIPID MEMBRANES - THE ROLE OF THE SURFACE CHARGE [VZAIMODEISTVIE LIPOPROTEIDOV PLAZMY S BISLOINYMI LIPIDNYMY MEMBRANAMI ROL' POVERKHNOSTNOGO ZARIADA]
M L. BELAIA, S. EL-KARADAGI, I N. GORSHKOVA, and V A TVERDISLOV (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 28, Mar -Apr 1983, p 254-259 In Russian. refs

A83-30406
THE EFFECT OF AN INTERMITTENT-LIGHT FREQUENCY ON THE QUANTUM YIELD OF CHLORELLA PHOTOSYNTHESIS [VLIIANIE CHASTOTY PRERYVANIIA SVETA NA VELICHINU KVANTOVOGO VYKHODA FOTOSINTEZA KHLORELLY]
V. B BORODIN, M IU. VAVILOV, and L N BELL (Akademiia Nauk SSSR, Institut Fotosinteza, Pushchino, Akademiia Nauk SSSR, Institut Fiziologii Rastenii, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 28, Mar -Apr. 1983, p 280-283 In Russian. refs

A83-30407
THE ENERGY BALANCE OF THE MYOCARDIUM AND ITS CORRECTION BY ANTIARRHYTHMICS [ENERGETICHESKII BALANS MIOKARDA I EGO KORREKTSIIA ANTIARITMIKAMI]
V. V. SHLYGIN (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Biofizika (ISSN 0006-3029), vol. 28, Mar.-Apr. 1983, p. 311-314 In Russian. refs

A mathematical model of the heart ventricle band is developed in order to study changes in the relation of mechanical work to the energy consumed in the process of contraction (defined as chi) during the transition of the myocardium from normal to hypoxic conditions under the effect of antiarrhythmics. It is shown that orciprenalin increases the value of chi in near-normal conditions; while quinidine, bretilium, procainamide, and propranolol can increase chi only under hypoxic conditions. Varapamile and lidocaine in cases when they improve conductions are suggested to be effective for any initial (before therapy) condition of the myocardium N B

A83-30408
THE TYPES OF SPATIAL-FREQUENCY FILTERS IN THE VISUAL CORTEX OF CATS [TIPY PROSTRANSTVENNO-CHASTOTNYKH FIL'TROV V ZRITEL'NOI KORE KOSHKI]
K N DUDKIN and I. V CHUEVA (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Biofizika (ISSN 0006-3029), vol 28, Mar -Apr. 1983, p 315-319 In Russian. refs

Three types of receptive fields (RFs) have been found during an investigation of the spatial-frequency filtering mechanisms in the visual cortex of cats The spatial-frequency selectivity of the first type of RFs (mainly simple fields) is manifested in a narrow range of grating orientations near the preferable one and is not found beyond this range. Two other types of RFs (mainly complex and very complex fields) are selective to spatial frequencies at any grating orientation. For the majority of RFs, two-dimensional spatial-frequency selectivity is manifested at short lengths of gratings where orientation selectivity does not appear. It is concluded that two-dimensional spatial-frequency filters are not Fourier-type filters. N.B.

A83-30409
THE STRUCTURAL DIFFERENCES OF THE SPATIAL-FREQUENCY FILTERS IN THE VISUAL CORTEX OF CATS [STRUKTURNYE RAZLICHIIA PROSTRANSTVENNO-CHASTOTNYKH FIL'TROV V ZRITEL'NOI KORE KOSHKI]
K. N DUDKIN and I. V CHUEVA (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Biofizika (ISSN 0006-3029), vol 28, Mar.-Apr. 1983, p. 320-325. In Russian refs

Sensitivity profiles of the receptive fields (RFs) of the visual cortex of cats along the width and length of the fields are determined The profiles are utilized as criteria for determining the structural differences of several types of spatial-frequency filters. It is shown that RFs with spatial-frequency selectivity in a narrow range of orientations near the preferable one have 'one-dimensional' profiles of sensitivity in this same narrow range. For RFs having spatial-frequency selectivity along the length and width of the RFs, two-dimensional sensitivity profiles are obtained along these RF dimensions. A group of profiles is found whose pattern of sensitivity profiles depends on the geometrical properties of the images which determine the functional changes of the filtering properties of the RFs The possible roles of different types of spatial-frequency filters in image processing are examined N.B.

A83-30410
THE EFFECT OF A MAGNETIC FIELD ON THE AGGREGATION OF RHODOPSIN MOLECULES DURING THE PHOTOOXIDATION OF THE PHOTORERECEPTOR MEMBRANES [VLIIANIE MAGNITNOGO POLIA NA AGREGATSIIU MOLEKUL RODOPSINA PRI FOTOOKISLENII FOTORETSEPTORNYKH MEMBRAN]
I. D POGOZHEVA, V A KUZNETSOV, V. A. LIVSHITS, and A. N KUZNETSOV (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 28, Mar.-Apr 1983, p. 336, 337 In Russian. refs

A83-30411
THE RELATIONSHIP OF THE PROPERTIES OF MODEL AND NATURAL CHANNEL PERMEABILITY IN BIOLOGICAL MEMBRANES [SOOTNOSHENIE SVOISTV MODEL'NYKH I PRIRODNYKH KANALOV PRONITSAEMOSTI V BIOLOGICHESKIKH MEMBRANAKH]
O V KRASILNIKOV, V I TERNOVSKII, and B. A. TASHMUKHAMEDOV (Akademiia Nauk Uzbekskoi SSR, Institut Biokhimii, Tashkent, Uzbek SSR) Biofizika (ISSN 0006-3029), vol. 28, Mar.-Apr. 1983, p 346, 347. In Russian. refs

A brief review is presented of research concerning the properties of conductivity channels formed from nonmembrane proteins (such as toxins, peptide hormones, and cytoplasmic channelformers) in a lipid bilayer It is suggested that these channelforming polypeptides may have evolutionarily originated from the usual

cellular membrane channels. The nonmembrane channelforming proteins may be the most accurate model of ionic channels of biological membranes. The selective action of some nonmembrane channelforming proteins results from the existence of receptor structures in target organs. N.B.

A83-30427
THE SPATIAL AND TEMPORAL ORGANIZATION OF THE RECEPTIVE FIELDS OF THE STRIATAL CORTEX IN CATS [PROSTRANSTVENNO-VREMENNAIA ORGANIZATSIIA RETSEPTIVNYKH POLEI STRIARNOI KORY KOSHKI]
V. D. GLEZER, V. E. GAUZELMAN, V M BONDARKO, and T A. SHCHERBACH (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) IN: Information processing in the visual system Higher visual functions Leningrad, Izdatel'stvo Nauka, 1982, p. 7-27. In Russian. refs

The responses of the simple visual receptive field of cats to sinusoidal gratings and to thin bars of light are compared. It is found that the excited and inhibited on-and-off zones of the field are composed of on-and-off subfields of exterior geniculate bodies which converge to a cortical neuron. It is determined that the organization of the field has linear properties The subfields can be phasic or tonic even at the boundaries of a single field The most general type of complex field is studied by masking half of the field which leads to an increase in the bandpass width of the field as a filter of spatial frequencies due to the appearance or the increase of the response to lateral low and high frequencies. The structure of the field is determined to be composed of linear and nonlinear subsystems which converge to the exit neuron of the complex field. It is concluded that complex fields are grating spatial-frequency filters N B

A83-30428
THE SPATIAL-FREQUENCY CHARACTERISTICS AND THE ORIENTATION SELECTIVITY OF RECEPTIVE FIELDS OF NEURONS OF THE VISUAL CORTEX [PROSTRANSTVENNO-CHASTOTNYE KHARAKTERISTIKI I ORIENTATSIONNAIA IZBIRATEL'NOST' RETSEPTIVNYKH POLEI NEIRONOV ZRITEL'NOI KORY]
IU E. SHELEPIN (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) IN Information processing in the visual system. Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p. 28-35 In Russian refs

The spatial-frequency characteristics of the receptive fields of neurons of the visual cortex are analyzed during the presentation of test gratings in four standard orientations. It is shown that the changes of the spatial-frequency characteristics depend on the orientation. The narrow-band inhibition spatial-frequency characteristics were observed. The opponent spatial-frequency characteristics are determined in the case of orthogonal orientations of the test gratings. It is proposed that an orientation-opponent system exists which participates in the construction of coordinate axes of the receptive field N B

A83-30439
THE MECHANISMS OF THE CLASSIFICATION OF VISUAL IMAGES ACCORDING TO SPATIAL SIGNS IN NORMAL DOGS AND AFTER THE EXCISION OF THE PARIETAL AND THE SUPERTEMPORAL CORTICES [MEKHANIZMY KLASSIFIKATSII ZRITEL'NYKH IZOBRAZHENII PO PROSTRANSTVENNYM PRIZNAKAM U SOBAK V NORME I POSLE EKSTIRPATSII TEMENNOI I VERKHNEVISOCHNOI KORY]
V. D. GLEZER (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), N. V PRAZDNIKOVA (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR), and T. A. MERING (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) IN: Information processing in the visual system: Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p. 108-125. In Russian refs

A83-30440
THE ROLE OF THE INFEROTEMPORAL AND INFEROPARIETAL CORTICES IN THE DESCRIPTION OF A VISUAL IMAGE IN MONKEYS [ROL' NIZHNEVISOCHNOI I NIZHNETEMENNOI KORY V OPISANII ZRITEL'NOGO OBRAZA U OBEZ'IAN]
V. V IAKOVLEV, F. N MAKAROV, and V. S. NIKITIN (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) IN: Information processing in the visual system. Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p. 125-135. In Russian refs

The invariance of a visual image to turning and to transformations using a mirror is studied in monkeys (Macaca mulatta) before and after the destruction of the inferotemporal and inferoparietal cortices It is found that in the normal monkeys, the visual image has different levels of invariance to various spatial transformations. After the destruction of the inferotemporal cortex the invariance decreases, while after the destruction of the inferoparietal cortex the invariance increases It is concluded that the mechanism for the formation of visual images is located in the inferotemporal region, while the mechanism for the evaluation of spatial relations is located in the inferoparietal region. N B

A83-30453
ENDOTOXIN PROTECTS AGAINST HYPEROXIC ALTERATIONS IN LUNG ENDOTHELIAL CELL METABOLISM
E. R BLOCK (Florida, University, Gainesville, FL) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Jan. 1983, p 24-30 Research supported by the U.S Veterans Administration refs (Contract NIH-HL-21115)

By evaluating the ability of endotoxin to prevent hyperoxic depressions in lung amine uptake, this study assessed whether bacterial endotoxin protects agains hyperoxid injury to the pulmonary endothelium Rats were given 500 or 1,500 microgram/kg body wt of endotoxin or saline (controls) 30 min before a 24-h or 7-day exposure to air or 100 percent O2 at 1 ATA Immediately after exposure, lungs were isolated, ventilated, and perfused via the pulmonary artery and the uptake of two amines, (C-14) serotonin and (H-3)norepinephrine, was measured. Amine uptake by the lungs of control rats exposed to 100 percent O2 for 24 h was significantly depressed, whereas amine uptake by the lungs of endotoxin-treated rats exposed to 100 percent O2 for 24 h was comparable to that in air-exposed controls Endotoxin also prevented hyperoxic depression of lung amine uptake and prolonged survival in rats exposed to 100 percent O2 for 7 days. Pretreatment of rats with endotoxin protects against hyperoxic injury to the pulmonary endothelium, which may account for the reduced mortality in endotoxin-treated animals. Author

A83-30454
ROLE OF BACTERIAL ENDOTOXINS OF INTESTINAL ORIGIN IN RAT HEAT STRESS MORTALITY
D A. DUBOSE, K BASAMANIA, L. MAGLIONE, and J ROWLANDS (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Jan. 1983, p. 31-36. refs

The effect of endotoxin tolerance or zymosan treatment on the stress mortality of unanesthetized rats was investigated. The incidence of invasion by gram-negative bacteria and their endotoxins was also studied in order to evaluate the role of gut-derived bacterial endotoxins after heat stress. Results show that endotoxin tolerance resulted in heat stress resistance. The estimated mean total thermal area which induced an LD50 in endotoxin-tolerant rats was determined to be significantly greater than that for nontolerant rats. While the rats were significantly more sensitive to endotoxin after zymosan treatment, this treatment did not alter the heat stress mortality rate. The results of other tests showed that endotoxemia did not occur as a result of heat stress, while no extraintestinal invasion was found. It is concluded that resistance to heat stress is not due to protection from gut-derived bacterial endotoxins, although resistance may possibly be associated with the ability of endotoxin tolerance to protect from shock syndromes. N.B.

A83-30457
EFFECT OF INCREASED BLOOD OXYGEN AFFINITY ON SKELETAL MUSCLE SURFACE OXYGEN PRESSURE FIELDS
E NYLANDER, N. LUND, and B WRANNE (Linkoping, University Hospital, Linkoping, Sweden) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Jan 1983, p 99-104 Research supported by the County Council of Ostergotland, Swedish Society of Medical Sciences, and Medicinska Forskningsradet. refs
(Contract MF-05956)

The administration of cyanate to rats over a period of 14 days was utilized to achieve a chronic left displacement of the blood O2 dissociation curve (ODC). An exchange transfusion with bisulfite-treated erythrocytes was used to achieve an acute left displacement of the ODC. Skeletal muscle surface O2 pressure fields (expressed as PO2 histograms) were measured in both cases while the rats were anesthetized, curarized, and artificially ventilated. Results show that the animals with chronically left-shifted ODC had normal PO2 histograms when breathing air,while during hypoxia (FIO2 0 12) four of the eight experimental and three of the seven control animals developed abnormal histograms. The majority of the animals that were to receive exchange transfusions of left-shifted ODC blood had normal histograms before transfusion, which caused some of the animals to become abnormal and others to become normal Similar results were also found for the control animals that received normal blood These results indicate that a left-shifted ODC has no adverse effect on muscle tissue oxygenation N.B.

A83-30461
POTENTIATION OF OXYGEN TOXICITY IN RATS BY DIETARY PROTEIN OR AMINO ACID DEFICIENCY
S M. DENEKE, S. N GERSHOFF, and B. L FANBURG (New England Medical Center Hospital, Boston; Tufts University, Medford, MA) Journal of Applied Physiology. Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Jan. 1983, p 147-151. refs
(Contract NIH-HL-26671)

A83-30464
ASCORBATE UPTAKE BY ISOLATED RAT ALVEOLAR MACROPHAGES AND TYPE II CELLS
V CASTRANOVA, J R WRIGHT, H D COLBY, and P. R. MILES (Appalachian Laboratory for Occupational Safety and Health; West Virginia University, Morgantown, WV) Journal of Applied Physiology· Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Jan. 1983, p 208-214 refs

The intracellular ascorbate content was measured and the ascorbate uptake was characterized in three fractions of isolated rat pneumocytes (alveolar macrophages, alveolar type II epithelial cells, and another fraction of small pneumocytes that contains neither macrophages nor type II cells). Results show that the rates for maximum ascorbate influx are similar in alveolar macrophages and type II cells after correction for differences in the membrane surface areas of these two types of lung cells. Ascorbate uptake by alveolar macrophages and type II cells is determined to be dependent on metabolic activity and extracellular sodium,while ascorbate uptake in other lung cells does not exhibit saturation kinetics and is not dependent on metabolism or sodium. These results indicate that alveolar macrophages and type II cells possess an energy-dependent cotransport system for ascorbate and sodium influx. It is suggested that the high ascorbate content and the existence of a specialized transport mechanism for ascorbate uptake may explain the relative resistance of alveolar macrophages and type II cells to oxidant injury. N B.

A83-30466
WORK-HEAT TOLERANCE IN ENDURANCE-TRAINED RATS
J. M. FRUTH and C. V GISOLFI (Iowa, University, Iowa City, IA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Jan. 1983, p. 249-253. refs
(Contract N00014-75-C-0597)

The purpose of this study was to determine if training in a cool (23 C) environment would alter the potential for mortality or for tissue damage (as indicated by serum transaminase concentrations) during a work-heat tolerance test (WHTT) to exhaustion Twenty-nine male Sprague-Dawley rats were trained (T) on a motorized treadmill for 6 wk, while 34 control animals of similar weight remained sedentary (S) Tissue damage among survivors 24 h following the WHTT and percent mortality were the same in both groups, however, T survivors (1) continued the test 44 percent longer (P less than 0.05), (2) performed significantly more work (P less than 0 05), and (3) sustained a 120 percent larger (P less than 0.05) thermal load - product of time and colonic temperature (Tc) above 40 C - than S survivors Mortality first occurred at a range in Tc of 40.6-41.0 C in the S group compared with a range of 41.6-42 0 C in the T group Thus endurance T rats can run longer in the heat, sustain greater thermal loads, and are less susceptible to work-induced thermal fatality than S rats Author

A83-30472
TISSUE AMMONIA AND AMINO ACIDS IN RATS AT VARIOUS OXYGEN PRESSURES
A. K SINGH and E W. BANISTER (Simon Fraser University, Burnaby, British Columbia, Canada) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Feb 1983, p. 438-444. Research supported by the Natural Sciences and Engineering Research Council of Canada. refs

The levels of ammonia and amino acids in blood, brain, heart, liver, and skeletal muscle were investigated in normal rats exposed to oxygen at various pressures until convulsions occurred, or to low oxygen pressure for a similar period of exposure that did not produce convulsions. The biochemical changes were related to the overt behavior and to the pressure profile. A significant increase in ammonia occurred first in the brain and liver at 3.40 atm Ammonia concentration was high in all tissues after convulsions occurred at 4 08 atm. Between 0 68 and 2.72 atm oxygen, tissue ammonia concentration was generally low and brain glutamate and gamma-aminobutyric acid were high. Tissue glutamate declined and glutamine increased above 2.72 atm These results confirm that ammonia accumulates in the brain and other tissues in the rat even in the absence of undue muscular activity during high-pressure oxygen exposure and is a significant factor in inducing convulsions C D

A83-30473
DYNAMIC RESPONSE OF LOCAL PULMONARY BLOOD FLOW TO ALVEOLAR GAS TENSIONS - ANALYSIS
B. J. B GRANT (California, University, La Jolla, CA) and A M SCHNEIDER (Michigan, University, Ann Arbor, MI) Journal of Applied Physiology. Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Feb. 1983, p. 445-452. Research supported by the Parker B. Francis Foundation, John F Perkins, Jr. Memorial Fund, California Lung Association, and University of Michigan. refs
(Contract NIH-HL-17331)

Mathematical models are developed using techniques derived from control theory which simulate the dynamic respons of local pulmonary blood flow to alveolar gas tensions Experimental results show that left lower lobe pulmonary blood flow (Q) and alveolar CO2 decrease then oscillate in a progressively damped manner when the lobar inspirate is changed from pure O2 to N2, while this damp oscillatory response of lobar Q is abolished by maintaining lobar Co2 constant The simplest model that predicts the experimental data is found to incorporate an exponential decrease of lobar Q to local alveolar hypoxia (time constant 3

min) and a damped oscillatory response of lobar Q to local alveolar hypocapnia. It is shown that the response to hypocapnia has two components: a vasodilator effect possibly related to the intracellular concentration of hydrogen ions and a vasoconstrictor effect possibly related to changes of molar CO2. These two components (time constants of 4.8 min interact with each other by means of cross-coupled elements (time constants of 4.8 min). N.B.

A83-30479
BREATHING HE-O2 SHIFTS THE LUNG PRESSURE-VOLUME CURVE OF THE DOG
N. BEREND, K. L. CHRISTOPHER, and N. F VOELKEL (National Jewish Hospital and Research Center, Denver, CO) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Feb 1983, p. 576-581 refs

A83-30482
CONTROL OF RESPIRATORY PATTERN IN CONSCIOUS DOG - EFFECTS OF HEAT AND CO2
S. ISCOE, R. B. YOUNG, and D. B. JENNINGS (Queen's University, Kingston, Ontario, Canada) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, March 1983, p 623-631. Research supported by the Medical Research Council of Canada and Ontario Thoracic Society. refs

A83-30483
VENTILATORY AND CIRCULATORY TRANSIENTS DURING EXERCISE - NEW ARGUMENTS FOR A NEUROHUMORAL THEORY
R. FAVIER, D. DESPLANCHES, J. FRUTOSO, M GRANDMONTAGNE, and R FLANDROIS (Lyon I, Universite, Lyon, France) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, March 1983, p 647-653 refs

Three tracheostomized dogs were used in a series of 42 treadmill experiments while monitoring ventilatory and respiratory responses As soon as 5 sec after the onset of exercise, pulmonary ventilation increased and then remained constant until the 30 sec point. In all experiments, the transition from rest to exercise was accompanied by hyperoxia in alveolar gas and arterial blood. At the onset of exercise, alveolar oxygen pressure increased gradually for 30 sec, while the alveolar CO2 increase was preceded by a transient fall within the initial 10 sec of exercise. It is concluded that initial ventilatory response to exercise is controlled by factors other than, or in addition to, endogenous CO2 production rate O.C.

A83-30485
HYPOXIC PULMONARY HYPERTENSION IN THE MAST CELL-DEFICIENT MOUSE
R. KRADIN, R. D. BRANDSTETER, G STATON, J. MOSS, C. A. HALES (Massachusetts General Hospital; Harvard University, Boston, MA), and Y. J. ZHU Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, March 1983, p. 680-686. refs

Following the suggestion that the mast cell is involved in hypoxic pulmonary hypertension, a comparison is made between the pulmonary vascular response to hypoxia in mast cell-deficient mice and that in normal mice. Chronic exposure to 10 percent O2 increased right ventricular peak systolic pressure during room air breathing under anaesthesia from 21 + or - 2 mmHg to 48 + or - 3 mmHg in the normal mouse, and from 22 + or - 4 mmHg to 53 + or - 4 mmHg in the mast cell-deficient mouse. Pulmonary arteries were similarly remodeled in the mast cell-deficient and normal mice, with hypertrophy and hyperplasia of smooth muscle, extension of smooth muscle into more peripheral vessels,l and apparent loss of peripheral small arteries. It is concluded that mast cells in mice do not appear to augment or clearly modulate hypoxic pulmonary hypertension. O.C.

A83-30486
MULTIPARAMETER MONITORING OF THE AWAKE BRAIN UNDER HYPERBARIC OXYGENATION
A MAYEVSKY (Johnson Research Foundation, Philadelphia, PA, Bar-Ilan University, Ramat Gan, Israel) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, March 1983, p. 740-748. Research supported by the Ministry of Health of Israel. refs

A mulltiparameter monitoring approach is used to elucidate the brain toxicity mechanism developed under hyperbaric oxygenation, continuously and simultaneously measuring the following parameters in the awake brain. tissue O2 partial pressure, extracellular K(+) activity, electrocorticography, and brain surface temperature in correlation with core temperature. Hyperbaric oxygenation results are given for the preconvulsive, convulsive and postconvulsive periods. During the convulsive period, seizures were accompanied by waves of spreading depression, with the high extracelular K(+) being pumped back into the cells, indicating that ATPase system was activated rather than inhibited. Cessation of respiration during the postconvulsive period resulted in a decrease of Po2 and available energy, leading to an increase in extracellular K(+) and in a general depolarization. O.C.

A83-30488
CARDIOVASCULAR RESPONSES TO TREADMILL EXERCISE IN RATS EFFECTS OF TRAINING
T T. GLEESON, W J MULLIN, and K. M BALDWIN (California, University, Irvine, CA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, March 1983, p. 789-793 refs
(Contract NIH-HL-22361, NIH-AM-06350)

The cardiovascular function effect of treadmill exercise training was studied by means of a 16-week program for adult female rats, which involved alternate days of endurance and sprint running. By comparison with an age- and body weight-matched sedentary group, a 16 percent increase in the capacity for maximal O2 consumption and a 38 percent increase in skeletal muscle citrate synthase activity was noted in the trained group No difference in absolute or relative hear weight was observed between the two groups, however, and there was no significant improvement in maximum cardiac output These data are consistent with previous biochemical and physiological measurements on the rodent heart, suggesting that no one cardiovascular variable is responsible for trained rats' increased O2 delivery. O.C

A83-30489
REPEATED DEVELOPMENT AND REGRESSION OF EXERCISE-INDUCED CARDIAC HYPERTROPHY IN RATS
R. C. HICKSON, T M. GALASSI, and K. A. DOUGHERTY (Illinois, University, Chicago, IL) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, March 1983, p 794-797. refs
(Contract NIH-RR-07158)

After being exercised by swimming 6 hr/day, 6 days/week for 3 weeks, and then given a 50-day period of inactivity, adult female rats underwent two additional 4-week periods of swimming and two 50-day periods of inactivity. Wet and dry ventricular weights increased between 19 and 29 percent above those of sedentary control animals following each training phase. An overall pattern of 10-12 percent higher total hydroxyproline per heart in the swimmers-exswimmers than in the controls is found throughout each training-inactivity phase, but these effects were not statistically significant. The present results furnish evidence for the reversibility of the development and regression of cardiac hypertrophy with training and detraining. Collagen accumulation does not become additive with repeated changes in cardiac size. O.C.

A83-30490
SKELETAL MUSCLE MITOCHONDRIA AND MYOGLOBIN, ENDURANCE, AND INTENSITY OF TRAINING
S. J HARMS and R C HICKSON (Illinois, University, Chicago, IL) Journal of Applied Physiology· Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, March 1983, p. 798-802. refs
(Contract NIH-RR-07158)

A 14-week regimen was undertaken in which female rats were trained by treadmill running for 40 min/day, 6 days/wk up to 11, 22 or 44 m/min. While the 11 m/min exercise increased the activities of the mitochondrial markers citrate synthase and succinate dehydrogenase, running faster by a factor of four did not significantly elevate the activities of these enzymes beyond those obtained after running at 11 m/min By contrast, there was a small but direct trend of training intensity with citrate synthase activity in fast twitch white vastus lateralis muscles Exercise time to exhaustion increased in proportion to training intensity. It is concluded that low intensity running is a sufficient stimulus to induce most of the total possible mitochondrial increase in the red fiber types, while very fast running speeds are needed to stimulate significant increases in white muscle mitochondria.
O.C.

A83-30496* Indiana Univ., Bloomington
SYMPATHOADRENAL RESPONSES TO COLD AND KETAMINE ANESTHESIA IN THE RHESUS MONKEY
M A KOLKA, R S. ELIZONDO, and R. P. WEINBERG (Indiana University, Bloomington, IN) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, April 1983, p. 896-900 Sponsorship· NASA-supportd research. refs
(Contract NIH-AM-16703)

The effect of cold exposure on the sympathoadrenal system is investigated in eight adult rhesus monekys with and without ketamine anesthesia. It is found that a 3 hr cold exposure (12 c) was associated with a 175 percent increase above control levels of norepinephrine (NE) and a 100 percent increase in epinephrine (E). Also observed were decreases in the core temperature, mean skin temperature, and mean body temperature No change in the plasma levels of NE and E from the control values was found during continuous infusion of ketamine, while the core temperature, mean skin temperature, and mean body temperature all showed greater declines with the addition of ketamine infusion to the cold exposure. Water exposure (28 C) under ketamine anesthesia resulted in a reduction of the core temperature to 33 C within 1 hr. Plasma levels of NE and E were found to be unchanged from control values at core temperatures of 35 and 33 C It is concluded that the administration of ketamine abolishes both the thermoregulatory response and the catecholamine response to acute cold exposure.
N.B.

A83-30500
ACID-BASE CURVE AND ALIGNMENT NOMOGRAMS FOR SWINE BLOOD
R. B. WEISKOPF, M. I. TOWNSLEY, K. K RIORDAN, D. HARRIS, and K CHADWICK (California, University, Letterman Army Institute of Research, San Francisco, CA) Journal of Applied Physiology. Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, April 1983, p 978-983 refs
(Contract DAMD17-80-C-0153)

A83-30504
CHANGES IN DIASTOLIC CORONARY RESISTANCE DURING SUBMAXIMAL EXERCISE IN CONDITIONED DOGS
I. Y S. LIANG and H. L. STONE (Oklahoma, University, Health Sciences Center, Oklahoma City, OK) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, April 1983, p. 1057-1062. refs
(Contract NIH-HL-22154; NIH-HL-07430)

A83-30508
EFFECT OF TRIIODOTHYRONINE ON BODY TEMPERATURE AT REST AND DURING EXERCISE IN DOGS
J. M STAGER (Indiana University, Bloomington, IN) Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, April 1983, p. 1115-1119 refs

The purpose of the study is to assess the effect of the thyroid hormones on body temperature at rest and during exercise and to begin a preliminary investigation of the mechanisms by which the thyroid hormone-induced thermoregulatory response manifests itself The results indicate that a modification of thyroid hormone concentrations alters body temperature both at rest and during exercise Since the changes in rectal temperature are similar at greatly different levels of heat production (rest and exercise) in both the hypothyroid (propylthiouracil-treated) and hyperthyroid (triiodothyronine-treated) dogs, a shift in the level at which body temperature is controlled is thought to have occurred Whether this thyroid-hormone-induced shift in body temperature is a direct effect of the thyroid hormones on the central nervous system's thermoregulatory control centers cannot be determined from the current study It is clear, however, that the body temperature effects of triiodothyronine and propylthiouracil treatment are independent of the metabolic accelerating effects of the thyroid hormones.
C.R.

A83-30510
LIQUID VENTILATION IN DOGS - AN APPARATUS FOR NORMOBARIC AND HYPERBARIC STUDIES
D. J. HARRIS, R R COGGIN, J. ROBY, M. FEEZOR, G TURNER, and P B BENNETT (Duke University, Medical Center, Durham, NC) Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, April 1983, p 1141-1148. Research supported by the Ministry of Defence /Procurement Executive/ of England. refs
(Contract NIH-HL-24049)

A liquid-breathing apparatus is described for remote surface studies and for use in experiments of near-hydraulic compression in dogs It consists of a flexible tank sealed against chamber gas, containing a supply of clean warmed (38 C) fluorocarbon (FC-80) equilibrated with 1 bar O2 and an electronically controlled means of delivering the liquid to the dog. Each breath (tidal volume 290 ml) was 'weighed' into the animal by the signal from a force platform supporting the dog and a digital control unit that automatically actuated inspired- and expired-line solenoid valves. The apparatus was successfully used to remotely maintain liquid ventilation in awake dogs for 2 h during surface studies (5 dogs) and in dives to 1,000 m seawater (5 dogs). During liquid breathing, mean arterial O2 partial pressure was always adequate (approximately equal to 300 Torr) and mean arterial CO2 partial pressure was normal (less than or equal to 40 Torr) An uncompensated metabolic acidosis was indicated by low pH values and a decrease in arterial base excess to -4 5 meq/l O2 uptake and CO2 output appeared to be significantly lower (42 and 35 percent, respectively) during liquid ventilation
Author

A83-30930* Harvard Univ., Boston, Mass
FLUID AND ELECTROLYTE HOMEOSTASIS IN SPACE - A PRIMATE MODEL TO LOOK AT MECHANISMS
M. C. MOORE-EDE, S. E. CHURCHILL (Harvard University, Boston, MA), C S. LEACH (NASA, Johnson Space Center, Houston, TX), F M SULZMAN (New York, State University, Binghamton, NY), C. A FULLER (California, University, Riverside, CA), and D. KASS (George Washington University, Washington, DC) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 4 p. refs
(Contract NSG-9054)
(SAE PAPER 820832)

To elucidate the physiological mechanisms involved in the cardiovascular and renal responses to spaceflight, a ground-based primate model has been developed which uses lower body positive pressure (LBPP) to simulate the chronic central vascular expansion

associated with weightlessnes. Four male squirrel monkeys with chronically implanted arterial and venous catheters and the capacity for continuous urine collection were subjected to LBPP for 4 days. Onset of LBPP resulted in an immediate diuresis, natriuresis and kaliuresis and a significant fall in plasma aldosterone and potassium levels. By day 2 the level of natriuresis had decreased by half, while potassium excretion and plasma aldosterone values had returned to control levels despite the persistence of a significantly reduced plasma potassium concentration It is concluded that the low plasma potassium level appears not to stimulate a compensatory fall in plasma aldosterone because of the simultaneous presence of body volume contraction acting to raise aldosterone levels Author

A83-30932
LIFE SCIENCES EXPERIMENTS FOR A SPACE PLATFORM/STATION
J D. FABRICANT (Texas, University, Galveston, TX) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 11 p. refs
(SAE PAPER 820834)

Features of an unmanned or manned life sciences space platform/station are described The station is required to interface with the Shuttle for payload exchange, maintenance, and retrieval, provide continuous electrical power, heat rejection, and a high communications data rate, be self-contained and controlled in orbit, expandable, have an indefinite lifetime, and allow periodic crew visits Life sciences options include a pressure vessel, rat housing, a vivarium for animals and plants, and a variable g centrifuge. Basic research would be carried out on the effects of a zero-g environment on developmental biology, genetics,and aging, plant physiology, metabolism and bone and muscle tissue, the cardiovascular system, bodily fluids, and electrolytes, and on vestibular reactions and behavior. Experimentation would also be performed on fetal development and birth. The research is essential if space colonies are ever to become a reality M.S.K.

A83-30940* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
AN EVALUATION OF MICROORGANISMS FOR UNCONVENTIONAL FOOD REGENERATION SCHEMES IN CELSS - RESEARCH RECOMMENDATIONS
B. O. STOKES (Stokes Biochemical Co., Logan, UT) and G R. PETERSEN (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 9 p. refs
(SAE PAPER 820852)

The benefits and deficiencies of various candidates for a controlled ecological life support system (CELSS) for manned spacecraft missions of at least 3-14 yr are discussed Conventional plants are considered unacceptable due to their inefficient production of foodstuffs and overproduction of stems and leafy matter. The alternate concepts are algae and/or bacteria or chemical synthesis of food. Microorganisms are considered the most promising because of their direct use of CO2 and possible utilization of waste streams. Yeasts are cited as the most viable candidates, since a large data base and experience already exists in the commercial food industry The addition of hydrogen bactria and solar-grown algae is recommended, together with genetic manipulation experiments to tailor the microorganisms to production of foodstuffs closer to the 70 percent carbohydrate, 20 percent protein, and 10 percent lipid optimal food currently accepted The yeast strain, Hansenula polymorpha, has been successfully grown in methanol and encouraged to produce a 55 percent carbohydrate content. M.S.K.

A83-30941* New Hampshire Univ., Durham.
SOYCHMBR.I - A MODEL DESIGNED FOR THE STUDY OF PLANT GROWTH IN A CLOSED CHAMBER
C REINHOLD (New Hampshire, University, Durham, NH) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 17 p refs
(Contract NCC2-27)
(SAE PAPER 820853)

The analytical model SOYCHMBER I, an update and alteration of the SOYMOD/OARDC model, for describing the total processes experienced by a plant in a controlled mass environment is outlined The model is intended for use with growth chambers for examining plant growth in a completely controlled environment, leading toward a data base for the design of spacecraft food supply systems SOYCHMBER I accounts for the assimilation, respiration, and partitioning of photosynthate and nitrogen compounds among leaves, stems, roots, and potentially, flowers of the soybean plant. The derivation of the governing equations is traced, and the results of the prediction of CO2 dynamics for a seven day experiment with rice in a closed chamber are reported, together with data from three model runs for soybean. It is concluded that the model needs expansion to account for factors such as relative humidity M.S K

A83-31151
COSMOCHEMISTRY AND THE ORIGIN OF LIFE; PROCEEDINGS OF THE ADVANCED STUDY INSTITUTE, MARATEA, ITALY, JUNE 1-12, 1981
C PONNAMPERUMA, ED. (Maryland, University, College Park, MD) Institute sponsored by NATO. Dordrecht, D Reidel Publishing Co (NATO Advanced Study Institutes Series Volume C101), 1983, 394 p

Topics in the chemical evolution of life are discussed The subjects addressed include. cosmochemistry and the origin of life; synthesis of the chemical elements; the largest molecules in space interstellar dust; impact of solar system exploration on theories of chemical evolution and the origin of life; the chemical composition and climatology of the earth's early atmosphere, dating of the earliest sediments on earth Also considered are: inorganic chemistry of earliest sediments bioinorganic chemical aspects of the origin and evolution of life, biologically mediated isotope fractionations. biochemistry, geochemical significance, and preservation in the earth's oldest sediments; organic molecules as chemical fossils - the molecular fossil record. (For individual items see A83-31152 to A83-31160) C D.

A83-31157
THE DATING OF THE EARLIEST SEDIMENTS ON EARTH
S MOORBATH (Oxford University, Oxford, England) IN: Cosmochemistry and the origin of life, Proceedings of the Advanced Study Institute, Maratea, Italy, June 1-12, 1981 . Dordrecht, D. Reidel Publishing Co, 1983, p 213-233 refs

Published isotopic age evidence for early Precambrian sedimentary rocks containing biogenic markers is critically reviewed. The age of sedimentation can sometimes be obtained by direct analysis of the sediments themselves, but more frequently by age measurements on stratigraphically related volcanic rocks, or by interpolation between dated older basement rocks and younger intrusive rocks. Provided that stratigraphical/geochronological correlations are correct there is little doubt that sediments containing algal stromatolites were being deposited approximately 3450 - 3300 m.y. ago, and that true microfossils occur in rocks dated at approximately 3300-3200 m.y. Evidence relating to possible biogenic markers in rocks reliably dated at approximately 3800-3750 m.y. is more difficult to evaluate. Much scope remains for future work. Author

A83-31158
INORGANIC CHEMISTRY OF EARLIEST SEDIMENTS - BIOINORGANIC CHEMICAL ASPECTS OF THE ORIGIN AND EVOLUTION OF LIFE
E.-I. OCHIAI (Juniata College, Huntingdon, PA) IN: Cosmochemistry and the origin of life; Proceedings of the Advanced Study Institute, Maratea, Italy, June 1-12, 1981 Dordrecht, D Reidel Publishing Co., 1983, p. 235-276. refs

The significance of inorganic chemistry in the study of chemical and biological evolution is examined. The effects of inorganic compounds on organisms is addressed, showing the biological roles of the essential elements. The importance of zinc and magnesium for the polymerization of DNA and RNA, and the existence of iron-sulfur compounds in the most primitive organisms are cited as examples. The possible roles played by inorganic compounds in the process leading up to the formation of life are discussed, and the influence of inorganic chemistry on the course of biological evolution is explored The evolution of atmospheric oxygen and the dependence on it of the oxidation states of elements and biological evolution is discussed The bioinorganic chemistry of sediments is discussed in general and in detail, focusing on banded iron formation and copper Finally, the influence on sediments of atmospheric oxygen pressure is considered C.D.

A83-31159* Max-Planck-Institut fuer Chemie, Mainz (West Germany).
BIOLOGICALLY MEDIATED ISOTOPE FRACTIONATIONS - BIOCHEMISTRY, GEOCHEMICAL SIGNIFICANCE AND PRESERVATION IN THE EARTH'S OLDEST SEDIMENTS
M SCHIDLOWSKI (Max-Planck-Institut fuer Chemie, Mainz, West Germany) IN: Cosmochemistry and the origin of life; Proceedings of the Advanced Study Institute, Maratea, Italy, June 1-12, 1981 Dordrecht, D. Reidel Publishing Co., 1983, p. 277-322. Research sponsored by the Deutsche Forschungsgemeinschaft. refs
(Contract NSF DEB-77-225-B; NSG-7489)

Preferential metabolization of isotopically light carbon and sulfur has resulted in a fractionation of the stable isotopes of these elements on a global scale, with the light species (C-12, S-32) markedly concentrated in biogenic materials. Since the biological effects are basically retained when carbon and sulfur are incorporated in sediments, the respective fractionations are propagated into the rock section of the geochemical cycle, this having consequently caused a characteristic bipartition of both elements between 'light' and 'heavy' crustal reservoirs Preservation of the biological isotope effects in sedimentary rocks makes it possible to trace the underlying biochemical processes back over most of the geological record According to the available evidence, biological (autotrophic) carbon fixation arose prior to 3.5(if not 3 8) billion years ago, while the emergence of dissimilatory sulfate reduction antedates the appearance of the oldest presumably bacteriogenic sulfur isotope patterns in rocks between 2.7 and 2.8 billion years old. Hence, biological control of the terrestrial carbon and sulfur cycles has been established very early in the earth's history Author

A83-31160* Bristol Univ (England).
ORGANIC MOLECULES AS CHEMICAL FOSSILS - THE MOLECULAR FOSSIL RECORD
G. EGLINTON (Bristol, University, Bristol, England) IN: Cosmochemistry and the origin of life; Proceddings of the Advanced Study Institute, Maratea, Italy, June 1-12, 1981 Dordrecht, D. Reidel Publishing Co., 1983, p. 323-359 Research supported by the Natural Environment Research Council. refs
(Contract NGL-05-003-003)

The study of biochemical clues to the early earth and the origin of life is discussed. The methods used in such investigation are described, including the extraction, fractionation, and analysis of geolipids and the analysis of kerogen. The occurrence of molecular fossils in the geological record is examined, discussing proposed precursor-product relationships and the molecular assessment of deep sea sediments, ancient sediments, and crude petroleums. Alterations in the molecular record due to diagenesis and catagenesis are considered, and the use of microbial lipids as molecular fossils is discussed. The results of searches for molecular fossils in Precambrian sediments are assessed. C D.

A83-31162
SELECTIVE MODIFICATION OF GULTATHIONE METABOLISM
A. MEISTER (Cornell University, New York, NY) Science (ISSN 0036-8075), vol. 220, April 1983, p 472-477. refs

Glutathione, a tripeptide thiol found in virtually all cells, functions in metabolism, transport, and cellular protection. It participataes in the reduction of disulfides and other molecules, and conjugates with compounds of exogenous and endogenous origin It protects cells against the destructive effects of reactive oxygen intermediaties and free radicals Modifications of glutathione metabolism may be achieved by administration of selective enzmye inhibitors, and also by giving compounds that increase glutathione synthesis. Such effects are useful in chemotherapy and radiation therapy and in protecting cells against the toxic effects of drugs, other foreign compounds, and oxygen Author

A83-31165
THE EFFECTS OF DIRECT-CURRENT MAGNETIC FIELDS ON TURTLE RETINAS IN VITRO
M. S. RAYBOURN (California, University, Berkeley, CA) Science (ISSN 0036-8075), vol. 220, May 13, 1983, p. 715-717 refs
(Contract DE-AC03-76SF-00098)

Direct-current magnetic fields of 10 to 100 gauss cause a significant short-term reduction of the in vigro electroretinographic b-wave response in turtle retina. This response compression is not accompanied by the usual reduction in retinal sensitivity that occurs with background illumination Furthermore, this effect is obtained only briefly after the offset of ambient lighting in the diurnal light-dark cycle of nonhibernating animals. Author

A83-31166
SOCIAL STRESS AND ATHEROSCLEROSIS IN NORMOCHOLESTEROLEMIC MONKEYS
J R. KAPLAN, F. M LUSSO, E. W. MILLER (Bowman Gray School of Medicine, Winston-Salem, NC), S. B. MANUCK (Pittsburgh, University, Pittsburgh, PA), D M. TAUB (Yemassee Primate Center, Yemassee, SC), and T. B. CLARKSON Science (ISSN 0036-8075), vol. 220, May 13, 1983, p. 733-735. Research supported by the R J. Reynolds Industries refs
(Contract NIH-HL-14164; NIH-R01-HL-26561)

Socially stressed adult male cynomolgus monkeys (Macaca fascicularis) fed a low fat, low cholesterol diet developed more extensive coronary artery atherosclerosis than unstressed controls Groups did not differ in serum lipids, blood pressure, serum glucose, or ponderosity. These results suggest that psychosocial factors may influence atherogenesis in the absence of elevated serum lipids. Psychosocial factors thus may help explain the presence of coronary artery disease (occasionally severe) in people with low or normal serum lipids and normal values for the other 'traditional' risk factors. Author

A83-31167
FUNCTIONAL ORGANIZATION OF THE SECOND CORTICAL VISUAL AREA IN PRIMATES
R. B. H. TOOTELL, R. L. DE VALOIS (California, University, Berkeley, CA), M. S SILVERMAN (California, University, San Francisco, CA), and G H. JACOBS (California, University, Santa Barbara, CA) Science (ISSN 0036-8075), vol. 220, May 13, 1983, p. 737-739. NSF BNS-78-86171 PHS-EY-00014 PHS-EY-02052. refs
(Contract NSF BNS-78-86171; PHS-EY-00014; PHS-EY-02052)

A83-31168
SINGLE VISUAL NEURONS CODE OPPOSING MOTION INDEPENDENT OF DIRECTION
B. J. FROST (Queen's University, Kingston, Ontario, Canada) and K. NAKAYAMA (Smith-Kettlewell Institute of Visual Sciences, San Francisco, CA) Science (ISSN 0036-8075), vol 220, May 13, 1983, p. 744, 745. Sponsorship: Natural Sciences and Engineering Research Council of Canada. refs
(Contract NSERC-A-0353; NIH-EY-03884)

Cells in intermediate and deeper layers of the pigeon optic tectum respond best when a textured background pattern is moved in the opposite direction to a moving test spot. Complete inhibition occurs when the background moves in the same direction as the test stimulus. Most noteworthy is the invariance of this relationship over a wide range of test spot directions. These cells represent a higher level of abstraction in a motion-detecting system and may play a role in figure-ground segregation or the discrimination of the motion of an object from selfinduced optical motion Author

A83-31314
THE SEARCH FOR THE 'SLEEP HORMONE' [POISKI 'GORMONA SNA']
V. M. KOVALZON (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii, Moscow, USSR) Priroda (ISSN 0032-874X), April 1983, p 13-21. In Russian refs

A review of research concerning investigations of the factor or factors which give rise to sleep in various animals is presented. Attention is focused on studies of the identification and isolation of several peptides which promote sleep in animals The possibility that these peptides may be artifacts and whether these peptides can evoke full natural sleep are examined in detail N B.

A83-31334
A CALORIMETRIC APPROACH TO INVESTIGATING THE EFFECT OF ELECTROMAGNETIC RADIATION AT RADIO FREQUENCIES ON THE PLASMATIC MEMBRANE OF ERYTHROCYTES [KALORIMETRICHESKII PODKHOD K ISSLEDOVANIIA VLIIANIIA ELEKTROMAGNITNOGO IZLUCHENIIA RADIOCHASTOTNO DIAPAZONA NA PLAZMATICHESKUIU MEMBRANU ERITROTSITOV]
G G. ZHADAN, IU. A KIM, V L. SHNYROV, I. G AKOEV, and IU A LAZAREV (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 269, no 3, 1983, p 747-749. In Russian refs

A83-31342
THE CHARACTER OF PROTEIN SYNTHESIS IN THE BRAINS OF HIBERNATING MAMMALS [O KHARAKTERE BELKOVOGO SINTEZA V GOLOVNOM MOZGE ZIMNESPIASHCHIKH MLEKOPITAIUSHCHIKH]
L V DERII and M. B. SHTARK (Akademiia Nauk SSSR, Institut Klinicheskoi i Eksperimental'noi Meditsiny, Novosibirsk, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 269, no 4, 1983, p. 1010-1013. In Russian. refs

A83-31818
POLYMERIZATION OF BRAIN TUBULIN IN AND AROUND THE AREA OF APPLICATION OF AN ELECTRIC FIELD
P. M. VASILEV, R. DRONZIN, G. VULEVSKI, M. VASILEVA, and G. GEORGIEV (B'lgarska Akademiia na Naukite, Tsentralna Laboratoriia po Biofizika, Sofia, Bulgaria) Bolgarskaia Akademiia Nauk, Doklady (ISSN 0366-8681), vol. 36, no. 1, 1983, p 109-112. refs

A83-31819
INFLUENCE OF MAGNETIC FIELD ON THE PROCESS OF SELF-ASSEMBLY OF TUBULIN
P. M. VASILEV, R. DRONZIN, and M VASILEVA (B'lgarska Akademiia na Naukite, Tsentralna Laboratonia po Biofizika, Sofia, Bulgaria) Bolgarskaia Akademiia Nauk, Doklady (ISSN 0366-8681), vol. 36, no. 1, 1983, p. 113-115. refs

The influence of magnetic fields on the self-assembly of tubulin in vitro was studied, and the formation of parallel unidirectionally oriented microtubules was demonstrated. The isolation of the tubulin from rats' brains is described, and the arrangement of the microtubules as parallel unidirectionally oriented forms under the action of the magnetic field is shown. Straight angle microtubules are seen along with microtubular bundles, the latter more frequently than under the influence of an electric field. Arcuate and spherically bent structures seem to be specific for the effect of constant magnetic field The spontaneous assembly of tubulin takes place under conditions specific for the formation of microtubular structures only. Different forms of tubulin manifest the same capacity for orientation along the magnetic field gradient. C D.

A83-31820
CHANGES IN KININ KALLIKREIN SYSTEM IN RABBITS WITH EXPERIMENTAL ATHEROSCLEROSIS TREATED WITH PROTEIN HYDROLYSATE 'HYDROPROT'
T M. IANKOVA, K. M DEMIREVA, and I. A. POPDIMITROV (Varna Medical Institute, Varna, Bulgaria) Bolgarskaia Akademiia Nauk, Doklady (ISSN 0366-8681), vol. 36, no. 1, 1983, p 149-151. refs

A83-31971
THE DIRECT REACTIONS OF SMOOTH MUSCLES OF THE MAJOR CEREBRAL ARTERIES TO ACUTE HYPOXIA AND HYPERCAPNIA [NEPOSREDSTVENNYE REAKTSII GLADKIKH MYSHTS MAGISTRAL'NYKH ARTERII GOLOVNOGO MOZGA NA OSTRUIU GIPOKSIIU I GIPERKAPNIIU]
A L AZIN (Sverdlovskii Meditsinskii Institut, Sverdlovsk, USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Mar.-Apr. 1983, p 12-15. In Russian refs

A83-31972
CHANGES IN THE VEGETATIVE BALANCE OF AN ORGANISM DURING EXPERIMENTAL HYPOKINESIA [IZMENENIE VEGETATIVNOGO BALANSA ORGANIZMA PRI EKSPERIMENTAL'NOI GIPOKINEZII]
E. A MARKOVA and L V ZORIA (Ternopol'skii Meditsinskii Institut, Ternopol, Ukrainian SSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Mar.-Apr. 1983, p. 25-29. In Russian. refs

A *mathematical method for analyzing cardiac rhythm* is employed to determine the effect of experimental hypokinesia on the vegetative balance in rats. Results show a dependence between the initial condition of the vegetative nervous system and the reactions of rats to hypokinesia The animals most resistant to the stress effects of hypokinesia were determined to be those with a steady vegetative balance in the initial conditions, while the rats least resistant to hypokinesia were those animals which exhibited a depressed tonus of the sympathetic nervous system in the initial conditions. It is concluded that this relationship allows the use of a statistical method for determining heart rhythm in experimental conditions in order to predict the adaptive possibilities of an organism. N.B.

A83-31973
THE MICROCIRCULATORY CONDITION DURING BURN SHOCK IN RATS AFTER A PROLONGED LIMITATION OF MOTOR ACTIVITY [SOSTOIANIE MIKROTSIRKULIATSII PRI OZHOGOVOM SHOKE U KRYS POSLE DLITEL'NOGO OGRANICHENIIA DVIGATEL'NOI AKTIVNOSTI]
IU. M. SHTYKHNO and S. E. BORISOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Mar.-Apr. 1983, p. 29-33. In Russian. refs

A83-31974
THE CHANGES IN THE LIVER AND MUSCLES DUE TO THE EFFECT OF PHYSICAL EXERCISE DURING OVERHEATING IN DIFFERENT WATER REGIMES [IZMENENIIA PECHENI I MYSHTS POD VLIIANIEM FIZICHESKOI NAGRUZKI NA FONE PEREGREVANIIA PRI RAZLICHNYKH VODNYKH REZHIMAKH]
K P LEVCHENKO (Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Mar.-Apr. 1983, p. 68-70 In Russian. refs

The histochemical changes in the liver and muscles of rats during physical exercise following overheating at 40 C and with limited water intake were determined. Results show that physical exercise undertaken following the combined effects of overheating and a limited intake of fluids causes destructive changes in the liver and muscles with a sharp decrease in the glycogen content of these tissues. Physical exercise performed following overheating but with a free water regime did not lead to destructive changes in liver and muscle tissues in comparison with exercise in normal conditions N B.

A83-32051
THE EFFECT OF ACTIVATORS OF CAMP ACCUMULATION ON THE SEPARATE STAGES OF GENOME EXPRESSION IN CELLS DURING ACUTE RADIATION INJURIES OF ORGANISMS. VI - PECULIARITIES OF THE INHIBITION OF RNA SYNTHESIS ON A TEMPLATE OF ISOLATED CHROMATIN BY SEPARATE FRACTIONS OF HISTONES FROM THE LIVER OF NORMAL, IRRADIATED AND SEROTONIN-TREATED RATS [VLIIANIE AKTIVATOROV NAKOPLENIIA TSAMF NA OTDEL'NYE ETAPY EKSPRESSII GENOMA V KLETKAKH PRI OSTROM LUCHEVOM PORAZHENII ORGANIZMA. VI - OB OSOBENNOSTIAKH INGIBIROVANIIA SINTEZA RNK NA MATRITSE IZOLIROVANNOGO KHROMATINA OTDEL'NYMI FRAKTSIIAMI GISTONOV IZ PECHENI NORMAL'NYKH, OBLUCHENNYKH I ZASHCHISHCHENNYKH SEROTONINOM KRYS]
L. A GALKINA, B. A. TSUDZEVICH, and N E KUCHERENKO (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR) Radiobiologiia (ISSN 0033-8192), vol 23, Mar -Apr. 1983, p 147-151 In Russian. refs

A83-32052
THE MECHANISM OF THE DEGRADATION OF CHROMATIN IN THE THYMOCYTES OF IRRADIATED RATS. VI - THE POSTIRRADIATION CHANGES IN THE ACTIVITY OF POLY(ADP-RIBOSE)-POLYMERASE [MEKHANIZM DEGRADATSII KHROMATINA V TIMOTSITAKH OBLUCHENNYKH KRYS. VI - POSTRADIATSIONNYE IZMENENIIA AKTIVNOSTI POLI/ADF-RIBOZO/POLIMERAZY]
R. N. ZOTOVA, S. R UMANSKII, and V I. TOKARSKAIA (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Radiobiologiia (ISSN 0033-8192), vol 23, Mar -Apr. 1983, p 152-156. In Russian. refs

A83-32053
AN INVESTIGATION OF DNA SYNTHESIS IN THE LIVER OF IRRADIATED AND SEROTONIN-TREATED RATS FOLLOWING THE REMOVAL OF THE CYCLOHEXIMIDE BLOCK [IZUCHENIE SINTEZA DNK PRI OBLUCHENII I ZASHCHITE SEROTONINOM V PECHENI KRYS POSLE SNIATIIA TSIKLOGEKSIMIDNOGO BLOKA]
L I. ASLAMOVA, IA. B. BLIUM, B. A TSUDZEVICH, and N E KUCHERENKO (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR) Radiobiologiia (ISSN 0033-8192), vol. 23, Mar -Apr 1983, p. 157-160. In Russian refs

A83-32054
THE CHANGES IN THE CHROMOSOME PATTERN OF MOUSE LYMPHOSARCOMA CELLS DURING PROLONGED IRRADIATION [IZMENENIIA KHROMOSOMNOI KARTINY KLETOK LIMFOSARKOMY MYSHEI PRI DLITEL'NOM OBLUCHENII]
V JURASKOVA, V DRASIL (Ceskoslovenska Akademie Ved, Biofysikalni Ustav, Brno, Czechoslovakia), V. KLIMENT, and R. TUSCANY (Institut Hygieny a Epidemiologie, Prague, Czechoslovakia) Radiobiologiia (ISSN 0033-8192), vol 23, Mar.-Apr 1983, p 172-176. In Russian. refs

A83-32055
THE COMPARATIVE INVESTIGATION OF THE RADIOSENSITIVITY OF NORMAL AND REGENERATING TISSUES. I - THE INTERPHASE DEATH OF CELLS AND THE DEGREE OF APLASIA OF REGENERATING AND NORMAL TISSUES OF THE BONE MARROW AND SPLEEN OF C57B1 MICE [SRAVNITEL.NOE ISSLEDOVANIE RADIOCHUVSTVITEL'NOSTI NORMAL'NYKH I REGENERIRUIUSHCHIKH TKANEI. I - INTERFAZNAIA GIBEL' KLETOK I STEPEN'APLAZII REGENERIRUIUSHCHIKH I NORMAL'NYKH TKANEI KOSTNOGO MOZGA I SELEZENKI MYSHEI LINII S57B1]
N S SAMOKHVALOVA and M. F. POPOVA (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR) Radiobiologiia (ISSN 0033-8192), vol 23, Mar.-Apr 1983, p 177-181 In Russian refs

A83-32056
SEVERAL PROBLEMS OF THE CHEMICAL PROTECTION OF GOLDEN HAMSTERS FROM IONIZING RADIATION [NEKOTORYE VOPROSY KHIMICHESKOI ZASHCHITY ZOLOTISTYKH KHOMIACHKOV OT IONIZIRUIUSHCHEI RADIATSII]
V A. SAIKOVA and A. G. SVERDLOV (Akademiia Nauk SSSR, Leningradskii Institut Iadernoi Fiziki, Gatchina, USSR) Radiobiologiia (ISSN 0033-8192), vol 23, Mar.-Apr. 1983, p. 182-186 In Russian. refs

It was found that S-2-(omega-aminopropylaminoethyl)-thiophosphorous acid (gammaphos) exerts a protective effect on golden hamsters (which are characterized by a high radiosensitivity of the intestine) against X-rays and to a lesser extent against neutron radiation. However, the protective effect of gammaphos was not statistically reliable for X-ray irradiation during conditions of hibernation. Hibernation during the irradiation and in the postirradiation period was found to significantly increase the radiosensitivity of the animals. In addition, the effect of hibernation was determined to depend on its duration N B

A83-32057
THE POSSIBLE EFFECT OF THE NATURAL BACKGROUND OF IONIZING RADIATION ON THE DEVELOPMENT OF MAMMALS [O VOZMOZHNOM VLIIANII ESTESTVENNOGO FONA IONIZIRUIUSHCHEI RADIATSII NA RAZVITIE MLEKOPITAIUSHCHIKH]
A. M KUZIN, L V. SLOZHENIKINA, L. A FIALKOVSKAIA, and V. N. PRIMAK-MIROLIUBOV (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Radiobiologiia (ISSN 0033-8192), vol 23, Mar.-Apr 1983, p. 192-195 In Russian. refs

The effect of lowering the natural radiation background on the development of rats is investigated. Young rats during postnatal ontogenesis were placed in a low-background radiation chamber which provided for a 10-fold decrease in the natural radiation background. Results show a deceleration in the development of the animals which was detected using the criterion of the individual growth of the body weight during 10 days of observations The addition of uranium salts to the low-background radiation chamber in an amount sufficient to restore the natural radiation background was found to remove this retarding effect. N.B

A83-32058
THE ROLE OF CHANGES IN THE OXYGEN CONCENTRATION BY THE MODIFICATION OF THE REPRODUCTIVE DEATH OF CELLS IN VITRO. II THE MODIFICATION OF THE RADIOSENSITIVITY DURING CHANGES IN THE RATE OF OXYGEN ABSORPTION BY THE CELLS [ROL' IZMENENIIA KONTSENTRATSII KISLORODA PRI MODIFIKATSII REPRODUKTIVNOI GIBELI KLETOK IN VITRO. II - MODIFIKATSIIA RADIOCHUVSTVITEL'NOSTI PRI IZMENENII SKOROSTI POGLOSHCHENIIA KISLORODA KLETKAMI]
IU N KORYSTOV (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Radiobiologiia (ISSN 0033-8192), vol 23, Mar.-Apr. 1983, p 200-204 In Russian refs

A83-32059
THE SEASONAL RADIOSENSITIVITY OF RATS AND DOGS [SEZONNAIA RADIOCHUVSTVITEL'NOST' KRYS I SOBAK]
S A ROGACHEVA, O V LUZANOVA, E N. KIRILLOVA, L. D MURZINA, and T I URIADNITSKAIA (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) Radiobiologiia (ISSN 0033-8192), vol. 23, Mar.-Apr. 1983, p. 205-209 In Russian. refs

The effect of gamma-radiation (LD40-LD100) on 10,500 rats and 350 dogs was investigated during different seasons of the year over a period of 10 years. Results show that the radiation sensitivity for both species of animals was the highest in August and September, and the lowest in January and February The seasonal DMF for rats and dogs was 1 24 and 1.31 for LD16, 1.13 and 1.17 for LD50, and 1.04 and 1.07 for LD84. The curves for the seasonal radiosensitivity for dogs at LD84, LD50, and LD16 exhibit a uniphasic character throughout the year. For rats, the seasonal curves at LD84 are uniphasic, while the curves at LD50 and especially at LD16 exhibit a second peak of resistance in June The increase in the radiosensitivity of rats and dogs was found to be correlated with an increase in the number of leukocytes in the peripheral blood of the animals N B

A83-32060
THE SUBCELLULAR DISTRIBUTION OF A CA(2+)-DEPENDENT PROTEIN REGULATOR IN THE GRAY MATTER OF THE BRAIN OF NORMAL AND X-IRRADIATED RATS [SUBKLETOCHNOE RASPREDELENIE CA(++)-ZAVISIMOGO BELKOVOGO REGULIATORA V SEROM VESHCHESTVE MOZGA KRYS V NORME I POD VLIIANIEM RENTGENOVSKOGO OBLUCHENIIA]
A. N. VASILEV, T. I. PARKHOMETS, G G MELNIK, L I TOMACHINSKAIA, and N. E. KUCHERENKO (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR) Radiobiologiia (ISSN 0033-8192), vol 23, Mar -Apr 1983, p. 224-226 In Russian. refs

A83-32061
THE ACTIVITY OF 5-NUCLEOTIDASE IN LEUKOCYTES, ERYTHROCYTES, AND BLOOD SERUM OF RATS WITH RADIATION SICKNESS [AKTIVNOST' 5-NUKLEOTIDAZY V LEIKOTSITAKH, ERITROTSITAKH I SYVOROTKE KROVI KRYS PRI LUCHEVOI BOLEZNI]
I. N. LITOVCHENKO (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR) Radiobiologiia (ISSN 0033-8192), vol. 23, Mar.-Apr. 1983, p. 233-235. In Russian. refs

A83-32062
THE EARLY CHANGES IN THE ACTIVATION OF NUCLEOSIDE DIPHOSPHATEKINASE IN THE BRAIN AND LIVER OF RATS FOLLOWING TOTAL-BODY GAMMA-IRRADIATION AT AN ABSOLUTELY LETHAL DOSE [RANNIE IZMENENIIA NUKLEOZIDDIFOSFATKINAZNOI AKTIVNOSTI GOLOVNOGO MOZGA I PECHENI KRYS PRI OBSHCHEM GAMMA-OBLUCHENII V ABSOLIUTNO LETAL'NOI DOZE]
I. V SAVITSKII and E. R. NAGIEV (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR) Radiobiologiia (ISSN 0033-8192), vol. 23, Mar.-Apr. 1983, p. 237-240. In Russian. refs

A83-32063
THE EFFECT OF THE RADIATION DOSE RATE ON THE FORMATION OF DOUBLE-STRAND DNA BREAKS [VLIIANIE MOSHCHNOSTI DOZY OBLUCHENIIA NA OBRAZOVANIE DVUNITEVYKH RAZRYVOV DNK]
N. V. KONDAKOVA and V. V. SAKHAROVA (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skaia Laboratoriia Biologicheskikh Struktur, Moscow, USSR) Radiobiologiia (ISSN 0033-8192), vol. 23, Mar.-Apr. 1983, p 243-246. In Russian. refs

The effects of ionizing radiation at varying dose rates on purified DNA solution are investigated Preparations of Co-60 (at a dose rate of 20 gram-roentgens/min) were employed as sources of gamma-radiation, while preparations of P-32 (at dose rates of 0.03-0 06 gram-roentgen/min) were used as sources of beta-radiation. Results show that double-strand breaks in the DNA were formed more readily at the higher dose rates than at the lower dose rates when equivalent doses of radiation were applied to the DNA samples Possible mechanisms to explain this effect are examined. N B

A83-32064
THE RESPONSE OF THE LYMPH AND BLOOD COAGULATION SYSTEMS TO GAMMA-RADIATION AT HIGH ALTITUDES [REAKTSIIA SVERTYVAIUSHCHEI SISTEMY LIMFY I KROVI NA GAMMA-OBLUCHENIE V USLOVIIAKH VYSOKOGOR'IA]
S. B DANIIAROV and V V PUKHOV (Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR) Radiobiologiia (ISSN 0033-8192), vol 23, Mar.-Apr 1983, p 247-250 In Russian refs

The coagulation and cellularity of the blood and lymph in the thoracic duct was investigated in dogs exposed to total-body gamma-radiation at a dose of 2 5 gram-roentgens at altitudes of 760 m and 3200 m above sea level following a one-month period of adaptation. It was found that the irradiation of the dogs at low altitudes resulted in hypercoagulation of the blood and pancytopenia, followed by an increase in the coagulation of the lymph above the background, significant lymphopenia, and a sharply increased number of erythrocytes. Similar responses were found in the dogs at the higher altitude, but these animals exhibited less-expressed disorders of the coagulation properties and the cellular composition of both the blood and the lymph It is concluded that these results indicate the lessening of radiation injuries at high altitude conditions in comparison with lower altitudes N.B

A83-32065
THE EFFECT OF PRODUCTS OF ERYTHROCYTE DEGRADATION ON THE MIGRATION OF HEMOPOIETIC STEM CELLS IN LETHALLY-IRRADIATED MICE [VLIIANIE PRODUKTOV RASPADA EVITROTSITOV NA MIGRATSIIU STVOLOVYKH KROVETVORNYKH KLETOK U LETAL'NO OBLUCHENNYKH MYSHEI]
N M. NOVIKOV, B G. IUSHKOV, and S N. MIKHAILOVA (Altaiskii Meditsinskii Institut, Barnaul; Sverdlovskii Meditsinskii Institut, Sverdlovsk, USSR) Radiobiologiia (ISSN 0033-8192), vol. 23, Mar -Apr. 1983, p 253-255. In Russian refs

A83-32066
AN INVESTIGATION OF THE BIOLOGICAL ACTIVITY DURING IRRADIATION OF CALF SPLEEN EXTRACTS CONTAINING AN INHIBITOR OF DNASE I [ISSLEDOVANIE BIOLOGICHESKOI AKTIVNOSTI SELEZENOCHNYKH EKSTRAKTOV TELIAT, SODERZHASHCHIKH INGIBITOR DNKAZY I, PRI OBLUCHENII]
O. I. OLONTSEVA, V. A. DROZHENNIKOV, V. A. LIASHENKO, O S. PEREVEZENTSEVA, E. B. ORLOVA, and G. V. KALISTRATOV (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Radiobiologiia (ISSN 0033-8192), vol. 23, Mar.-Apr. 1983, p. 259-262. In Russian refs

A83-32067
THE PATTERNS OF THE POSTIRRADIATION RECOVERY OF AN ORGANISM IN CONDITIONS OF EXTERNAL NONUNIFORM RADIATION EFFECTS. VII - THE DEPENDENCE OF THE POSTIRRADIATION RADIOSENSITIVITY OF RATS ON THE DOSE OF PRELIMINARY IRRADIATION IN THE CASE OF AN ORAL FORM OF RADIATION SICKNESS [ZAKONOMERNOSTI POSTRADIATSIONNOGO VOSSTANOVLENIIA ORGANIZMA V USLOVIIAKH VNESHNIKH NERAVNOMERNYKH LUCHEVYKH VOZDEISTVII. VII - ZAVISIMOST' POSTLUCHEVOI RADIOCHUVSTVITEL'NOSTI KRYS OT DOZY PREDVARITEL'NOGO OBLUCHENIIA PRI ORAL'NOI FORME LUCHEVOI BOLEZNI]
G M. AVETISOV, R. N. ZAITSEVA, and M. V. SERGEEVA (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) Radiobiologiia (ISSN 0033-8192), vol. 23, Mar.-Apr. 1983, p 263-267. In Russian. refs

A83-32068
THE CHANGES IN THE ELECTRICAL ACTIVITY OF THE STOMACH OF RATS FOLLOWING DIRECT X-RAY IRRADIATION [IZMENENIIA ELEKTRICHESKOI AKTIVNOSTI ZHELUDKA KRYS PRI PRIAMOM RENTGENOVSKOM OBLUCHENII]
K. P. BALITSKII, A. V SYROMIATNIKOV, and L P VOITENKO (Akademiia Nauk Ukrainskoi SSR, Institut Problem Onkologii, Kiev, Ukrainian SSR) Radiobiologiia (ISSN 0033-8192), vol 23, Mar.-Apr. 1983, p 267-270 In Russian. refs

A83-32069
AN EVALUATION OF THE POSSIBILITY OF PREDICTING THE INDIVIDUAL RADIOSENSITIVITY OF RATS BY THEIR REACTION TO HYPOXIA AND THE ADMINISTRATION OF ADRENOCORTICOTROPIN [OTSENKA VOZMOZHNOSTI PROGNOZIROVANIIA INDIVIDUAL'NOI RADIOCHUVSTVITEL'NOSTI KRYS PO IKH REAKTSII NA GIPOKSIIU I VVEDENIE AKTG]
A O. KOROTKEVICH and A. IU GRIGOREV (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) Radiobiologiia (ISSN 0033-8192), vol. 23, Mar.-Apr 1983, p. 277-282. In Russian. refs

A83-32096
THE SHIFTS IN THE BLOOD CIRCULATION SYSTEM DURING THE EFFECT OF HIGH EXTERNAL TEMPERATURE ON AN ORGANISM [SDVIGI V SISTEME KROVOOBRASHCHENIIA PRI VOZDEISTVII NA ORGANIZM VYSOKOI VNESHNEI TEMPERATURY]
B. I. TKACHENKO and G. F. SULTANOV (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol 14, Apr.-June 1983, p. 28-55. In Russian. refs

A review is presented of research concerning the reactions of the blood circulation system in humans and animals to single and multiple thermal actions. The role of the vasomotor reactions of the skin in the maintenance of temperature homeostasis is examined in conditions of a high temperature of the surrounding environment. Also considered is the reciprocity of the vascular relations between the skin and the internal organs, which causes various shifts in the sympathetic adrenergic activity. The leading role of the elevated temperature of the body in the formation of the systemic and regional hemodynamic reactions is emphasized. The hormone-humoral and local mechanisms of vasomotor reactions during thermal stress are discussed The optimization of the activity of the cardiovascular system in the process of the acclimation to high external temperatures is examined. N.B.

A83-32097
VASOPRESSIN AND THE CARDIOVASCULAR SYSTEM [VAZOPRESSIN I SERDECHNO-SOSUDISTAIA SISTEMA]
V. V FROLKIS, S F. GOLOVCHENKO, V. I. MEDVED, and R. A FROLKIS (Akademiia Meditsinskikh Nauk SSSR, Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol. 14, Apr.-June 1983, p. 56-81 In Russian. refs

A review is presented of research concerning the effect of vasopressin on the cardiovascular system, focusing on the action of the hormone on the coronary blood flow. The existing views about the role of the hormone in the development of pathologies of the cardiovascular system are discussed Data concerning the concentration of vasopressin in the blood during various physiological conditions of the organism are analyzed The mechanisms of the effect of the hormone on the blood vessels and heart are examined. It is proposed that in old age, vasopressin becomes especially important in the genesis of arterial hypertonia and coronary insufficiencies. N.B.

A83-32098
THE PROBLEM OF THE CONTRACTILITY OF THE MYOCARDIUM [PROBLEMA SOKRATIMOSTI MIOKARDA]
S S. GRIGORIAN, V IA. IZAKOV, V. S MARKHASIN, and A K. TSATURIAN (Sverdlovskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Sverdlovsk, USSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol. 14, Apr.-June 1983, p. 82-97 In Russian refs

A review is presented of research concerning the contractility of the myocardium The dependence of the electromechanical integration on the initial mechanical conditions and the current deformations is analyzed. The question of mechanical alteration is examined and the role of this phenomenon in the regulation of contraction is determined. It is shown that it is impossible to find an index of contractility which does not depend on the mechanical conditions of the heart's activity. Possible approaches to obtain the quantitative characteristics of contractility are discussed. N.B.

A83-32099
THE AMINERGIC CONTROL OF THE CEREBRAL ARTERIES [AMINERGICHESKII KONTROL' ARTERII GOLOVNOGO MOZGA]
A. L. AZIN (Sverdlovskii Gosudarstvennyi Meditsinskii Institut, Sverdlovsk, USSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol. 14, Apr.-June 1983, p. 98-115. In Russian. refs

A review is presented of research concerning the effect of monoamines on the tonus of the cerebral arteries and on the brain blood flow. It is shown that the aminergic mechanisms of the regulation of the brain blood flow are closely linked with the functional properties of the vascular smooth muscles, i.e., with the level of the excitement of the surface membranes and peculiarities of the electromechanical integration in the smooth muscle cells. The effect of the biogenic amines on the smooth musculature of the cerebral arteries during the development of hypoxic conditions is examined. N.B.

A83-32100
INTRACELLULAR FEEDBACK IN THE PROCESSES OF THE ELECTROMECHANICAL INTEGRATION OF THE MYOCARDIUM IN MAMMALS [VNUTRIKLETOCHNYE OBRATNYE SVIAZI V PROTSESSAKH ELEKTROMEKHANICHESKOGO SOPRIAZHENIIA MIOKARDA MLEKOPITAIUSHCHIKH]
K. IU. BOGDANOV, S. I ZAKHAROV, and L V. ROZENSHTRAUKH (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol 14, Apr.-June 1983, p 116-133. In Russian. refs

It is shown that the scheme of electromechanical integration cannot be represented as the sum of successive stages, the first of which is the depolarization of a membrane and the last of which is the contraction It is determined that each of the intervening stages has feedbacks which essentially change the functioning of the whole system. Thus, the dependence of the sensitivity of

myofibrils to Ca(2+) on their length can lead to the oscillatory character of the mechanical activity of the preparation. The intracellular concentration of Ca(2+) to a large extent determines the electrical activity of the membrane and its slow channels. Therefore, the recovery of the activity of the slow channels of the membrane must depend on the connecting speed of Ca(2+) within the cell. Feedback which regulates the function of the sarcoplasmic reticulum can lead to a renewed ejection of Ca(2+) from the reticulum and is the reason for the complex structure of contraction observed during several positive inotropic actions. N B.

A83-32459
VIBRATORY BEHAVIOR OF THE LUMBO-SACRAL JOINT AFTER ABLATION OF THE PULPOSUS NUCLEUS [COMPORTEMENT VIBRATOIRE DE LA CHARNIERE LOMBO-SACREE APRES ABLATION DU NUCLEUS PULPOSUS]
P. QUANDIEU (Service de Santedes Armees, Paris, France), L. PELLIEUX, and P. BORREDON Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p 44-49. In French

Five accelerometers were implanted along the first sacral and last lumbar vertebrae of four anesthetized baboons, which were then subjected to random, 0 5 g accelerations to study vibration damping by the spinal disks. Subsequent trials were performed with increasingly less disk matter, which was ablated away without damaging the fibrous ring. The vibratory transmissivity and frequency dependence of the transmissivity between each set of vertebrae were determined Attempts were made to detect any influences of the position of the accelerometers and the angle of repose of the animals. An enhancement of the high frequency transmissivity was detected in the lumbo-sacral joint in the absence of the nucleus, together with a shift to higher resonance frequencies in the 10-20 Hz range. M S.K

A83-32464
EDUCATION IN AEROSPACE MEDICINE AT THE GERMAN AIR FORCE INSTITUTE OF AVIATION MEDICINE
P. W. FRANK (German Air Force, Institute of Aviation Medicine, Furstenfeldbruck, West Germany) (International Academy of Aviation and Space Medicine and SocieteFrancaise de Physiologie et de Medecine Aeronautiques et Cosmonautiques, Congres International du Medecine Aeronautique et Spatiale, 29th, Nancy, France, Sept. 7-11, 1981) Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p 94-97

A83-32564
THE ROLE OF SUPRACHIASMATIC NUCLEI OF THE ANTERIOR HYPOTHALAMUS IN THE ORGANIZATION OF THE CIRCADIAN RHYTHMS OF LOCOMOTOR ACTIVITY IN RATS [ROL' SUPRAKHIAZMATICHESKIKH IADER PEREDNEGO GIPOTALAMUSA V ORGANIZATSII TSIRKADNYKH RITMOV DVIGATEL'NOI AKTIVNOSTI U KRYS]
S R. CHAPLYGINA and Z G. NEVRETDINOVA (Akademiia Nauk SSSR, Institut Biologicheskikh Problem Severa, Magadan, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 69, March 1983, p. 313-321. In Russian. refs

A83-32565
THE CHARACTERISTICS OF THE INTERACTION OF THE VESTIBULAR-OCULOMOTOR AND THE VISUAL SYSTEMS IN YOUNG ANIMALS [OSOBENNOSTI VZAIMODEISTVIIA VESTIBULO-GLAZODVIGATEL'NOI I ZRITEL'NOI SISTEM U MOLODYKH ZHIVOTNYKH]
E N. KOSMARSKAIA and V. I. BUTIKOVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 69, March 1983, p 343-350. In Russian. refs

A83-32566
THE ELECTROPHYSIOLOGICAL CHARACTERISTICS OF THE MUSCLE FIBERS OF RATS ADAPTED TO COLD [ELEKTROFIZIOLOGICHESKAIA KHARAKTERISTIKA MYSHECHNYKH VOLOKON KRYS, ADAPTIROVANNYKH K KHOLODU]
A. D. PSHEDETSKAIA and G. P. BELOUSOVA (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol 69, March 1983, p. 351-356. In Russian. refs

The development of the muscle excitation process in single muscle fibers was investigated using rats that had been adapted to cold conditions. Results show that the level of the membrane rest potential (MRP) and the amplitude of the action potential (AP) of muscle fiber were increased in the slow (soleus) muscle of rats adapted to cold, as compared to the control values. In the fast (gastrocnemius) muscle, the size of the MRP of the fibers was not significantly changed, while the amplitude of the AP of the fibers decreased. In addition, an increase in the general duration of the AP was observed in slow muscle fibers, while this value was shortened in fast muscle fibers. The duration of the AP peak was shortened in the fibers of both types of muscles. It is concluded that the adaptation of animals to cold evokes changes in the characteristics of the AP in both slow and fast muscles, which lead to the smoothing out of the functional differences between these muscles N B.

A83-32567
THE EFFECT OF CHANGES OF THE ELECTROLYTIC COMPOSITION OF THE PERILYMPH ON THE ENDOCOCHLEAR POTENTIAL [VLIIANIE IZMENENIIA ELEKTROLITNOGO SOSTAVA PERELIMFY NA ENDOKOKHLEARNYI POTENTSIAL]
B M SAGOLOVICH and I. L. MAZO (Ministerstvo Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Gorla i Nosa, Moscow, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol 69, March 1983, p. 357-361. In Russian. refs

A study is presented concerning the significance of the electrolytic composition of the perilymph for the electrical activity of the inner ear as measured by the endocochlear potential The perilymphatic space of the cochlea of guinea pigs was perfused with artificial perilymph with complete or partial removal of K, Na, or Ca ions A pronounced biphasic change of the endocochlear potential occurred in the absence or insufficiency of Na(+) in the perfused perilymph. An initial increase in the potential changed into a sharp and steady decrease, which quantitatively depended on the content of Na(+) in the perilymph. A deficit of K(+) in the perilymph evoked a significantly smaller and reversible decrease in the endocochlear potential. The removal of Ca(2+) from the perilymph only slightly affected the potential. N.B.

A83-32568
THE EFFECT OF NORADRENALINE ON THE SKIN THERMORECEPTORS [VLIIANIE NORADRENALINA NA TERMORETSEPTORY KOZHI]
T. V. KOZYREVA (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 69, March 1983, p 367-371. In Russian. refs

The activity of cold thermoreceptors of the peripheral skin after the injection of noradrenaline was studied in rats. Results show that following the intraperitoneal injection of noradrenaline, the impulse activity of cold receptors of the skin increased. This reaction occurred earlier than the rise in the rectal temperature evoked by noradrenaline A scheme of the functional interrelationship of the peripheral thermoreceptors and the sympathetic-adrenal system during the effect of cold on an organism is presented. N.B.

A83-32569
THE INTENSITY OF KININERGIC REACTIONS OF THE CARDIOVASCULAR SYSTEM FOR VARIOUS LEVELS OF THE ACTIVITY OF THE KALLIKREIN-KININ SYSTEM IN BLOOD PLASMA [INTENSIVNOST' KININERGICHESKIKH REAKTSII SERDECHNO-SOSUDISTOI SISTEMY PRI RAZLICHNOI AKTIVNOSTI KALLIKREIN-KININOVOI SISTEMY PLAZMY KROVI]
V. I. KISELEV and N M. LEBEDEV (Altaiskii Gosudarstvennyi Meditsinskii Institut, Barnaul, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol 69, March 1983, p. 386-390 In Russian refs

A83-32686
DRUG DISPOSITION UNDER HYPERBARIC AND HYPERBARIC HYPEROXIC CONDITIONS - MEPERIDINE IN THE DOG
W G KRAMER (Houston, University; Texas Medical Center, Houston, TX), D R GROSS, P. M MOREAU, and W. P FIFE (Texas A & M University, College Station, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, May 1983, p 410-412. NOAA-supported research. refs
(Contract PHS-210-81-6103)

Patients being treated for a variety of conditions with hyperbaria or hyperbaric hyperoxia, and ill or injured deep sea divers being decompressed, may require concomitant drug therapy. This study examined the possible effects of those conditions on the distribution and elimination of meperidine, using the dog as a model. The drug was administered to six mixed-breed dogs as a 1.4 mg/kg i v. bolus at 1 ATA breathing air, at 2.8 ATA breathing 100 percent O2, and at 6 ATA breathing air, and followed by serial blood sampling for 3 h. Statistical analysis showed no effects of hyperbaria or hyperbaric hyperoxia on the elimination half-life, total plasma clearance, or volume of distribution These studies demonstrated marked differences between man and the dog in the elimination of meperidine This probably means these results cannot be extrapolated to man. Author

A83-32687
HEMODYNAMIC EFFECTS OF DEXTRAN 40 ON HEMORRHAGIC SHOCK DURING HYPERBARIA AND HYPERBARIC HYPEROXIA
D. R. GROSS, P. M. MOREAU, M JABOR, D. W. WELCH, and W P. FIFE (Texas A & M University, College Station, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, May 1983, p 413-419 refs
(Contract PHS-210-81-6103, NOAA-NA-81AAD00092)

The quantitative effects of intravenous-Dextran-40 treatment of hemorrhagic shock on the cardiovascular system were studied in dogs during normobaric air breathing and at two depth/gas combinations (2 8 ATA/pure O2 and 6 ATA/air) which are commonly used in the treatment of decompression sickness Seven to ten days after instrumentation with a flowmeter and arterial and cardiac cannulae, baseline values of 14 hemodynamic parameters were obtained in groups of six dogs under each of the three specified conditions. Blood was then removed until mean aortic pressure fell to 40 mm Hg. After 30 min, Dextran-40 was administered until aortic pressure reached 90 percent of baseline, and measurements were taken at 15 and 30 min after infusion Although no significant differences in the cardiovascular parameters caused by hemorrhage or after treatment with Dextran-40 were observed, both the 2.8-ATA and 6-ATA groups were found to require more than twice as much Dextran-40 to normalize aortic pressure as the normobaric group This finding is considered important for the treatment of shock in diving-related accidents or in patients under hyperbaric-hyperoxia therapy T K.

A83-32688
POLYMERIC PROSTAGLANDIN PGBX AND OTHER PROSTAGLANDIN POLYMERS PROLONG SURVIVAL OF THE HEART OF THE HYPOXIC MOUSE
E POLIS (U S. Navy, Air Development Center, Warminster, PA) and F W COPE (Hahnemann Medical College, Philadelphia, PA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, May 1983, p. 420-424. refs
(Contract NR PROJECT 206-001)

A new chemical method for prolongation of survival under hypoxia is reported. Polymeric prostaglandin PGBx which shows beneficial effects on damaged mitochondria in vitro was used. Survival time of the intact hypoxic (6 percent O2) mouse as measured by electrocardiogram is prolonged by 100 percent or more by standard PGBx (mean polymer chain length = 7). Prostaglandin polymers of mean chain lengths of 2 to 3 also produced marked prolongation of survival Monomeric prostaglandin PGB1 was not effective for prolongation of survival. Author

A83-32692
BONE TISSUE OF HYPOKINETIC RATS - EFFECTS OF 24,25-DIHYDROXYCHOLECALCIFEROL AND VARYING PHOSPHORUS CONTENT IN THE DIET
A S. USHAKOV, I N. SERGEEV, M S. BELAKOVSKII (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR), V. B SPIRICHEV, N. V. BLAZHEEVICH, and N A BOGOSLOVSKII (Ministry of Health of USSR, Institute of Nutrition, Moscow, USSR) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, May 1983, p 447-451 refs

Severe hypokinesia of rats given the diet with a ratio of Ca:P = 1:0 5-1 3 was accompanied by hypocalcemia, development of osteoporosis, and some intensification of renal calcinosis The decrease of phosphorus consumption (Ca.P = 1:0 5-1:1) prevented a development of these changes in intact animals and increased bone mineralization in hypokinetic ones. Excessive phosphorus consumption (Ca·P = 1 3) produced hypocalcemia, hyperphosphatemia, and some osteoporotic changes in the bones of intact animals and intensified these changes with hypokinesia Administration of 24,25-dihydroxycholecalciferol, an active metabolite of vitamin D3, at a dose of 1.25 micrograms/d prevented a development of bone disorders, thus effectively stimulating diaphyses and epiphyses mineralization and correcting hypocalcemia in hypokinetic rats 24,25(OH)2D3 at the same dose did not intensify nephocalcinosis and produced no toxic symptoms with hypokinetic animals. Author

A83-32813* Marquette Univ , Milwaukee, Wis.
EFFECT OF HINDLIMB IMMOBILIZATION ON THE FATIGABILITY OF SKELETAL MUSCLE
F. A WITZMANN, D. H. KIM, and R. H FITTS (Marquette University, Milwaukee, WI) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, May 1983, p 1242-1248. refs
(Contract NIH-AM-22037, NAS9-15711)

The effect of 6 weeks of disuse atrophy produced by hindlimb immobilization was studied in situ (33 5 C) in the soleus and extensor digitorum longus muscles of rats. The results indicate that disuse causes preferential alterations in the isometric contractile properties of slow-twitch, as opposed to fast-twitch, skeletal muscles During continuous contractile activity, atrophied muscles were found to have lower ATP levels and an apparent increase in their dependence on anaerobic metabolism, as reflected by the more extensive depletion of glycogen and enhanced lactate formation. Although the atrophied muscles were determined to have fewer cross bridges and thus generated lower tension, the pattern of decline in active cross-bridge formation and tetanic tension during contractile activity was found to proceed in a manner similar to controls. N.B

A83-32814
SITE OF PULMONARY HYPOXIC VASOCONSTRICTION STUDIED WITH ARTERIAL AND VENOUS OCCLUSION
T. S. HAKIM, R P MICHEL, H. MINAMI, and H. K. CHANG (McGill University, Montreal, Canada) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, May 1983, p. 1298-1302. Research supported by the Medical Research Council of Canada. refs

The effects of hypoxia are compared with the effects of airway pressure elevation and with the effects of the infusion of serotonin, norepinephrine, and histamine using the arterial and venous occlusion technique in an in situ, isolated left lower lobe preparation of a dog lung The total arteriovenous pressure drop across the lobe was partitioned longitudinally into pressure drops across the relatively indistensible arteries and veins, and across the middle distensible vessels. Results show that both hypoxia and airway pressure elevation increased the total arteriovenous pressure drop across the lobe by increasing mainly the pressure drop across the small distensible vessels and that this increase was independent of flow rate It is determined that the effects of hypoxia were different from those elicited by the infusion of serotonin, norepinephrine, and histamine, which increased the pressure drop across the arterial or venous indistensible vessels in a flow-dependent manner. N.B

A83-32820
HYPERPNEA OF EXERCISE AT VARIOUS PIO2 IN NORMAL AND CAROTID BODY-DENERVATED PONIES
H. V. FORSTER, L. G. PAN, G E. BISGARD, R. P. KAMINSKI, S. M DORSEY, and M. A. BUSCH (Wisconsin, Medical College, Milwaukee, WI, U.S Veterans Administration Medical Center, Wood, WI; Wisconsin, University, Madison, WI) Journal of Applied Physiology· Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, May 1983, p. 1387-1393. Research supported by the U.S. Veterans Administration. refs
(Contract PHS-25739)

The effect of changes in inspired O2 on partial pressure of CO2 in arterial blood (PaCO2) during treadmill exercises in normal, acute (+2-4 weeks), and chronic (+1-2 yr) carotid body-generated (CBD) ponies was studied Among other results, it was found that PaCO2 decreased from rest during exercise, reaching a nadir usually between 15-30 s of exercise. Hyperoxia (PaO2 approximately 180 Torr) was found to accentuate the hypocapnia only in the normal ponies, while hypoxia (PaO2 48 Torr) attenuated the exercise-induced hypocapnia by 3-5 Torr in all ponies. It is concluded that the accentuated hypocapnia caused by eliminating (CBD) or reducing (hyperoxia) carotid chemoreceptor activity indicates that the chemoreceptors normally dampen alveolar ventilation (VA) at the onset of exercise In addition, the attenuation of the hypocapnia at the onset of exercise by hypoxia in CBD ponies suggests that a direct central nervous system effect of hypoxia dampens VA, while mechanisms tending to minimize the hypocapnia during exercise appear to adjust VA by modulating the tidal volume. N B.

A83-32822
EFFECT OF HYPOXIA AND HYPERCAPNIA ON CATECHOLAMINE CONTENT IN CAT CAROTID BODY
R. S. FITZGERALD, P GARGER, M C. HAUER, H. RAFF, and L FECHTER (Johns Hopkins University, Baltimore, MD) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, May 1983, p 1408-1413. refs
(Contract NIH-HL-10342; NIH-ES-01589; NIH-ES-00454)

A83-32957
A MATHEMATICAL MODEL FOR THE REGULATION OF GLYCOLYSIS BY THE OXIDATION OF PYRUVATE AND FATTY ACIDS IN THE MYOCARDIUM [MATEMATICHESKAIA MODEL' REGULIATSII GLIKOLIZA OKISLENIEM PIRUVATA I ZHIRNYKH KISLOT V MIOKARDE]
K L. ATOEV (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) Kibernetika i Vychislitel'naia Tekhnika (ISSN 0454-9910), no. 55, 1982, p 76-80 In Russian. refs

A mathematical model is developed of the processes linked with the synthesis of energy compounds in the myocardium and the mechanisms of their regulation, since disorders of the regulation of energy metabolism are one of the main reasons for the development of pathology in the myocardium. This mathematical model allows the determination of the conditions of the origination of the autofluctuation regime in the energy-synthesizing system of the myocardial cell. It is shown that the glycolytic fluctuations, the fluctuations of Ca(2+) in the systole-diastole cycle, and the low-frequency fluctuations linked with the switching from one type of substrate to another can be superimposed on the fluctuations of the tricarboxylic acid cycle in definite conditions in the energy-synthesizing system of the myocardial cell N.B.

A83-33109
MICROWAVE-INDUCED PRESSURE WAVES IN MAMMALIAN BRAINS
R. G. OLSEN (U.S. Naval Aerospace Medical Research Laboratory, Pensacola, FL) and J. C LIN (Illinois, University, Chicago, IL) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol BME-30, May 1983, p 289-294. refs
(Contract NSF ECS-80-26497)

This paper presents direct measurements of acoustic pressure waves in brains of rats, cats, and guinea pigs irradiated with pulsed 2.450 and 5 655 GHz microwaves A small disk hydrophone transducer was surgically implanted in brains of anesthetized animals Rectangular pulses were applied through horns, waveguides, and direct contact antennas. The results clearly indicate that pulsed microwaves induce acoustic pressure waves in the brain, confirming earlier theoretical predictions. Furthermore, hydrophone output waveforms and on-line analyzed spectra show that fundamental and second harmonics were nearly identical to those predicted by the thermoelastic theory However, the hydrophone records show complex sequences of higher order vibrational modes which deviate from predictions based on a homogeneous spherical model of the head Author

A83-33150
THE MORPHOLOGICAL CHANGES IN SEVERAL NUCLEI OF THE MIDBRAIN DURING VARIOUS PERIODS OF WATER DEPRIVATION IN WHITE RATS [MORFOLOGICHESKIE IZMENENIIA V NEKOTORYKH IADRAKH SVEDNEGO MOZGA PRI RAZLICHNYKH SROKAKH VODNOI DEPRIVATSII U BELYKH KRYS]
F. B ASKEROV, A. G. TAGIEVA, S. A. ALEKPEROVA, and A. A. SAMEDOV (Akademiia Nauk Azerbaidzhanskoi SSR, Institut Fiziologii, Baku, Azerbidzhan SSR) Akademiia Nauk Azerbaidzhanskoi SSR, Doklady (ISSN 0002-3078), vol. 38, no. 12, 1982, p. 66-69. In Russian refs

A83-33302
THE DEPENDENCE OF WOUND HEALING ON THE CONDITION OF THE IMMUNE SYSTEM [ZAVISIMOST' ZAZHIVLENIIA RANY OT SOSTOIANIIA IMMUNNOI SISTEMY]
D. P LINDNER, I N. BOLSHAKOV, I. A. POBERII, and O. N. STETSENKO (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Arkhiv Patologii (ISSN 0004-1955), vol. 44, no 11, 1982, p. 30-38 In Russian. refs

The dependence of wound healing on the condition of the immune system was investigated in rabbits with weak and strong delayed hypersensitive reactions (DHR) to phytohemagglutinin (PHA). The rate of contraction of the wound, the macroscopic control, the cytology of the wound exudate, and the quantitative and qualitative histology were examined. Results show that the

rate of wound healing in strong DHR to PHA is 1-1/2 times higher, while the death rate of wound infection is two times lower, than for weak DHR to PHA The responses of the immune system organs (thymus, spleen, and the regional lymph nodes) and the peripheral blood leukocytes were also found to differ significantly despite their initial structural homogeneity. N B.

A83-33315
THE CEREBRAL CORTEX - THE INTEGRATOR OF INFORMATION OF SENSORY INPUTS [KORA GOLOVNOGO MOZGA - INTEGRATOR INFORMATSII SENSORNYKH VKHODOV]
V. BRAITENBERG (Max-Planck-Institut fuer Biologische Kybernetik, Tuebingen, West Germany) Leningradskii Universitet, Vestnik, Biologiia (ISSN 0321-186X), Nov. 1982, p. 48-55 In Russian. refs

A review is presented of research concerning the neuronal and synaptic organization of the cerebral cortex, focusing on the structural-functional relationships at the levels of the synapses, individual neurons, neuronal assemblies, and the entire cerebral cortex. Topics considered include an examination of the cerebral cortex as the largest part of the gray matter of the brain of mammals, the type of symmetry of the cortical nerve network, the specifics of the synaptical inputs to neurons, the types of neurons, and the architectonics of the cortex Also examined are detector properties and cellular accumulations of neurons, learning; input, output, anad intracortical circuits; and several quantitative considerations of the morphology and physiology of neurons and the cerebral cortex. N.B.

A83-33316
A STUDY OF THE FATTY ACID COMPOSITION OF THE MAJOR BRAIN [IZUCHENIE ZHIRNOKISLOTNOGO SOSTAVA OSNOVNYKH GANGLIOZIDOV GOLOVNOGO MOZGA]
K. KLIAICH, A. CHASTEK, M. A. BESPALOVA, and S. IU TUMANOVA Leningradskii Universitet, Vestnik, Biologiia (ISSN 0321-186X), Nov. 1982, p 94-98 In Russian. refs

A83-33317
AN INVESTIGATION OF THE ELECTRICAL CONDUCTIVITY OF BIOLOGICAL SYSTEMS [OB ISSLEDOVANII ELEKTROPROVODNOSTI BIOLOGICHESKIKH SISTEM]
A V. ZHUCHKOV (Leningradskii Tekhnologicheskii Institut Kholodil'noi Promyshlennosti, Leningrad, USSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 94, Nov.-Dec. 1982, p. 404-420. In Russian refs

A review is presented of the major electrical characteristics of biological systems, the mechanism of their frequency dispersion, and the electrode impedance and its effect on the precision of the investigations A new electrophysical parameter is proposed: a generalized electrophysical parameter and the coefficient of frequency dispersion, which allows a fuller and more precise determination of the changes in an organism during the action of various physical and chemical processes In addition, recommendations are presented for choosing methods for investigating the electrical conductivity of biological systems. N.B

A83-33318
THE STRUCTURE OF THE MICROTUBULE ORGANIZATIONAL CENTERS IN A COMPARATIVE EVOLUTIONARY ASPECT [STROENIE TSENTROV ORGANIZATSII MIKROTRUBOCHEK V SRAVNITEL'NO-EVOLIUTSIONNOM ASPEKTE]
G. G. ONISHCHENKO (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 94, Nov.-Dec. 1982, p. 360-375. In Russian. refs

It is proposed that a unification of the basal body (the microtubule organizational centers /MOC/ of the organelle of motion) occurred at several phylogenetic levels with cytoplasmic MOC in interphase cells and with polar MOC in mytotic cells This unification was strengthened by the formation of MOC in multicellular animals, in which the centriole (a product of the evolutionary development of the basal body) began to function as a kinetic organelle, participating in the spatial organization of the cell. A complete loss of the basal body occurred with the origin of the higher plants. The role of MOC in higher plants evidently fulfills definite forms of fibrillar materials which are localized in the cell in various ways. N.B.

A83-33319
THE ROLE OF ERYTHROCYTES IN BLOOD COAGULATION AND IN BLOOD PLATELET FORMATION [O ROLI ERITROTSITOV V GEMOKOAGULIATSII I TROMBOOBRAZOVANII]
Z. D FEDOROVA and M. A. KOTOVSHCHIKOVA (Ministerstro Zdravookhraneniia RSFSR, Leningradskii Nauchno-Issledovatel'skii Institut Gematologii i Perelivaniia Krovi, Leningrad, USSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 94, Nov.-Dec 1982, p. 393-403 In Russian refs

A83-33320
THE INTERNALIZATION AND INTRACELLULAR CONVERSIONS OF BIOLOGICALLY ACTIVE POLYPEPTIDES AND THEIR RECEPTORS [INTERNALIZATSIIA I VNUTRIKLETOCHNYE PREVRASHCHENIIA BIOLOGICHESKI AKTIVNYKH POLIPEPTIDOV I IKH RETSEPTOROV]
S I KUSEN (Akademiia Nauk Ukrainskoi SSR, Institut Biokhimii, Lvov, Ukrainian SSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol 94, Nov.-Dec. 1982, p. 376-392. In Russian refs

A review is presented of research concerning the entry of hormones and growth factors into the cells of animals and humans, and the conversions within the cell of their components and the receptors of the plasma membrane which are specific for these compounds. Topics examined include the internalization by the cells of biologically active polypeptides, the intracellular conversions of hormone-receptor complexes, the mechanisms of internalization and the conversions of the ligand-receptor complexes, and the functional significance of the internalization of biologically active polypeptides It is shown that the internalization of biologically active polypeptides and their subsequent conversions play a very important role in the processes of the synthesis of DNA, RNA, and proteins. N.B.

A83-33321
THE POLYFUNCTIONALITY OF VISUAL RHODOPSIN [O POLIFUNKTSIONAL'NOSTI ZRITEL'NOGO RODOPSINA]
V. P SKULACHEV (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol 94, Nov.-Dec 1982, p. 331-344. In Russian refs

It is proposed that visual rhodopsin uses light energy to transfer electrical charges to the membrane, which causes the entry of Ca(2+) into the cytoplasm. The Ca(2+) ions block the Na(+)-channels into the outer membrane of the photoreceptor cell, which leads to the hyperpolarity of the membrane Rhodopsin may interact in another metabolic chain such that the long-lived intermediary product of rhodopsin photolysis, which interacts with protein transduction, promotes the replacement of GDP by GTP. The level of cGMP which activates the Na(+)-channels declines and the channels are closed. The first path of the excitation of the photoreceptors provides a high-speed process which includes only one stage of the strengthening of the signal and requires a high intensification of illumination. The second path via cGMP is slower, but with a dual cascade intensification, and provides the excitation in very weak light. At moderate intensities of light the GMP path decreases the receptivity of the photoreceptor cells to the following stimulus. This provides for a high sensitivity of the photoreceptor to weak light, its quick action on increasing the amount of light, and the ability to adapt to light and dark. N.B.

A83-33322
THE LEADING PROBLEMS OF CONTEMPORARY AGE PHYSIOLOGY, BIOCHEMISTRY, AND BIOPHYSICS AND THE INVESTIGATIONS OF THE SCHOOL OF A. V. NAGORNYI [VEDUSHCHIE PROBLEMY SOVREMENNYKH VOZRASTNYKH FIZIOLOGII, BIOKHIMII I BIOFIZIKI I ISSLEDOVANIIA SHKOLY A. V. NAGORNOGO]
V. N. NIKITIN (Khar'kovskii Gosudarstvennyi Universitet, Kharkov, Ukrainian SSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 94, Nov.-Dec. 1982, p. 421-432. In Russian. refs

A review is presented of various topics in gerontology, emphasizing the contributions of the scientific school of ontophysiologists created by A. V. Nagornyi. The contemporary theories of ontogenesis are examined, including the theory of the attenuated self-renewal of protoplasm. Studies concerning the 'footprints of age' in chromatin and the protein-synthesizing apparatus of the cell are discussed. It is proposed that as chromatin ages it includes lesser and lesser amounts of enzymes which repair and synthesize DNA. The matrix activity of chromatin and the protein-synthesizing apparatus is found to decline with age. The complex heterochromity in the age development of the glands of internal secretion and the value of their increlion are examined. The major current paths toward the experimental prolonging of life are also discussed N.B.

A83-33326
IMMUNOGLOBULIN GENES [GENY IMMUNOGLOBULINOV]
E. V. SIDOROVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Priroda (ISSN 0032-874X), Nov. 1982, p. 34-42. In Russian.

A discussion is presented of recent research concerning the mechanisms of antibody (immunoglobulin) formation and the directed regulation of the synthesis of immunoglobulins. Aspects examined include the structure of immunoglobulins, the biosynthesis of immunoglobulins, the genes of the light and heavy chains of immunoglobulins, the reconstruction of the genetic material for the production of immunoglobulins, and the events occurring after the reorganization of the DNA. Several unexplained problems concerning immunoglobulins are discussed, including the process of combining the immunoglobulin segments which are located far apart, what induces this combination, and what determines the choice of the future neighbor. N.B.

A83-33327
THE PATHOLOGY OF THE IMMUNE SYSTEM DURING INJURY [PATOLOGIIA IMMUNNOI SISTEMY PRI TRAVME]
V. N. ALEKSANDROV (Voenno-Meditsinskaia Akademiia, Leningrad, USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Nov.-Dec. 1982, p. 45-47. In Russian. refs

The basic cellular reactions which provide immunogenesis and control the immune response are studied in mice who had suffered a severe injury. Results show that the post-traumatic immunological deficiency develops in stages. The stage of evident immunological deficiency (up to 8 days following the injury) is characterized by the inhibition of the humoral immune response to sheep red blood cells and the activation of suppressor lymphocytes. The stage of latent immunological deficiency (from the eighth day following the injury) is characterized by a stimulation of the immune response to sheep red blood cells in the presence of a functional deficiency of T and B cell cooperation, T helper cells, and B cell precursors. The transition from the first to the second stage is mediated by the switching on of adaptation reactions: an increase in the capability of macrophages to induce the humoral immune response, an intensification of the migration of stem cells from the bone marrow to the lymph organs, and an increased capability of T cells for changing their differentiation in the myeloid direction. N.B.

A83-33328
THE INTERACTION OF PROSTAGLANDINS AND THE SYMPATHETIC-ADRENAL SYSTEM [O VZAIMODEISTVII PROSTAGLANDINOV I SIMPATIKO-ADRENALOVOI SISTEMY]
L. I. NEBOLSINA, V. S. POLESHCHUK, and KH. M. MARKOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Nov.-Dec. 1982, p. 48-50. In Russian. refs

The relationship of catecholamines and prostaglandins (PG) during a surplus of the entry and the deficit of prostaglandins was studied in rats in vivo, in vitro, and ex vivo. The effect of indomethacine on the excretion of catecholamines from the urine, the effect of indomethacine and PGE2 on the secretion of catecholamines in isolated adrenal glands, and the effect of PGE2 and indomethacine on the absorption of (C-14)-noradrenaline by the myocardium were determined. Results indicate an interaction of PGE2 and the sympathetic-adrenal system which depends to a great extent on the conditions of the experiment and the object of examination. In a single animal during various experimental conditions (in vivo, in vitro, and ex vivo) and for different experimental objects, the relationship of prostaglandins and catecholamines occurs in different ways. N.B.

A83-33329
ULTRASTRUCTURAL CHANGES OF ACINAR CELLS OF THE PANCREAS DUE TO THE EFFECTS OF COLD [UL'TRASTRUKTURNYE IZMENENIIA ATSINARNYKH KLETOK PODZHELUDOCHNOI ZHELEZY POD VOZDEISTVIEM KHOLODA]
K. P. ARABADZHIAN, N. K. PERMIAKOV, G. P. TITOVA, and P. S. SIMAVORIAN (Erevanskii Institut Usovershenstvovaniia Vrachei, Yerevan, Armenian SSR; Nauchno-Issledovatel'skii Institut Skoroi Pomoshchi, Moscow, USSR) Biulleten' Eksperimental'noi Biologii i Meditsiny (ISSN 0006-4041), vol. 94, Nov. 1982, p. 103-106. In Russian. refs

The patterns of the ultrastructural changes of the acinar cells (AC) of the pancreas following cooling by chlorethylene to -30 C were studied in rats using electron microscopy. Results show that the cooling led to the destruction of intracellular membranes as well as to damages of the cell organelles followed by diffusion of the zymogen content to the hyaloplasm and interstice. These changes are found to correspond to the condition of necrobiosis in which the AC have lost the ability for autophagocytosis. During 3-6 hr after thawing, irreversible cryodestruction led to complete cell necrosis. The cells less affected by the cold were subsequently destroyed due to enzymatic autolysis and circulatory hypoxia N.B.

A83-33330
THE EFFECT OF PYRIODOXINE, RIBOFLAVIN, AND GLUTAMIC ACID ON THE ACTIVITY OF LYSOSOMAL HYDROLASES IN THE LIVER AND BLOOD SERUM OF RATS DURING TRAUMATIC STRESS [VLIIANIE PIRIDOKSINA, RIBOFLAVINA I GLUTAMINOVOI KISLOTY NA AKTIVNOST' LIZOSOMAL'NYKH GIDROLAZ V PECHENI I SYVOROTKE KROVI KRYS PRI TRAVMATICHESKOM STRESSE]
L. N. KOBYLIANSKII (Kishinevskii Meditsinskii Institut, Kishinev, Moldavian SSR) Biulleten' Eksperimental'noi Biologii i Meditsiny (ISSN 0006-4041), vol. 94, Nov. 1982, p. 47-50. In Russian. refs

A83-33332
THE EFFECT OF PREPARATIONS ACTING MAINLY IN THE REGION OF THE PERIPHERAL M-CHOLINE REACTIVE SYSTEMS ON BONE MARROW EOSINOPHILS [VLIIANIE PREPARATOV, DEISTVUIUSHCHIKH PREIMUSHCHESTVENNO V OBLASTI PERIFERICHESKIKH M-KHOLINOREAKTIVNYKH SISTEM, NA EOZINOFILY KOSTNOGO MOZGA]
IU. B. DESHEVOI and P. D. GORIZONTOV (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) Biulleten' Eksperimental'noi Biologii i Meditsiny (ISSN 0006-4041), vol. 94, Nov. 1982, p. 61-63. In Russian. refs

A83-33334
HEMOPHILIC BACTERIA IN THE NASOPHARYNX OF HEALTHY INDIVIDUALS [GEMOFIL'NYE BAKTERII NOSOGLOTKI ZDOROVYKH LIUDEI]
I. A. BOCHKOV and N. A SEMINA (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Epidemiologii, Moscow, USSR) Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (ISSN 0049-8726), Nov. 1982, p 21-25 In Russian. refs

A83-33335
THE EFFECT OF STRESS ON THE TENSILITY, STARLING'S MECHANISM, AND RESISTANCE OF THE MYOCARDIUM TO HYPOXIA [VLIIANIE STRESSA NA RASTIAZHIMOST', MEKHANIZM STARLINGA I REZISTENTNOST' MIOKARDA K GIPOKSII]
E. IA VORONTSOVA, M. G. PSHENNIKOVA, and F Z. MEERSON (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiia, vol. 22, Nov. 1982, p 68-72. In Russian. refs

The effects of emotional and painful stress (EPS) on the tensility, Starling's mechanism, and resistance of the myocardium to hypoxia and the Ca(2+) outflow are investigated in the isolated, perfused rat atrium Results show that EPS decreased the myocardial tensility, depressed the Starling's curve, and decreased the efficiency of Starling's mechanism. In addition, a decrease in the resistance of the myocardium to hypoxia was found, as well as an excess of calcium in animals exposed to stress. These results indicate that the disorders of the contractile function of the atrium as a consequence of stress are due to the decreased efficiency of the energy-supply system and the calcium-transport system in cardiomyocytes The decrease in the resistance to hypoxia and the excess of calcium may contribute to the heart muscle damage in coronary and other diseases related to energy shortage and increased calcium content in cardiomyocytes N B

A83-33336
THE EFFECT OF EXOGENOUS AMINO ACIDS ON THE CARDIAC CONTRACTILE FUNCTION AND THE METABOLISM OF NITROGEN COMPOUNDS DURING ANOXIA [VLIIANIE EKZOGENNYKH AMINOKISLOT NA SOKRATITEL'NUIU FUNKTSIIU I METABOLIZM AZOTISTYKH SOEDINENII SERDTSA PRI ANOKSII]
O. I. PISARENKO, E. S SOLOMATINA, I. M STUDNEVA, V E. IVANOV, and V I. KAPELKO (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiia, vol. 22, Nov. 1982, p. 63-68. In Russian. refs

The content of ammonia and the main products of its metabolism were studied in rats in conditions of oxygenation and anoxia of the myocardium during the action of glutamic acid and arginine. The contractile function of the isolated heart was also determined. Results show that the production of ammonia, alanine, and glutamine increases and the levels of glutamate and aspartate decreased in conditions of anoxia, while the total pool of free amino acids remained unchanged. The addition of glutamic acid or arginine to the perfusate reduced the anoxic contracture and the heart maintained a higher pressure than usual for anoxic conditions Both amino acids were determined not to affect ammonia synthesis, but enhanced the binding of ammonia in the heart tissue These reactions, such as glutamine and urea synthesis, required an increased expenditure of ATP. It is concluded that these two amino acids do not effect the synthesis of ammonia, but do increase the reaction of its energy-dependent linkages and strengthens the cardiac contractile function during hypoxia. N B

A83-33338
THE FORMATION OF AN ORGANIC MATRIX IN DISTRACTIONAL BONE REGENERATE AND THE CHARACTERISTICS OF ITS MINERALIZATION DURING EXPERIMENTAL CRUS STRETCHING [FORMIROVANIE ORGANICHESKOGO MATRIKSA DISTRAKTSIONNOGO REGENERATA KOSTI I OSOBENNOSTI EGO MINERALIZATSII PRI UDLINENII GOLENI V EKSPERIMENTE]
G A. ILIZAROV, V. N. MATVEENKO, A. N GAIDAMAK, and IU. M IRIANOV (Kurganskii Nauchno-Issledovatel'skii Institut Eksperimental'noi i Klinicheskoi Ortopedii i Travmatologii, Kurgan, USSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 28, Nov -Dec. 1982, p 27-33. In Russian. refs

A83-33339
THE CONDITION OF GLYCOLYSIS IN THE HEART DURING NECROSIS PRODUCED AFTER THE PRELIMINARY ACTION OF STRESS [SOSTOIANIE GLIKOLIZA V SERDTSE PRI EGO NEKROZE, VOSPROIZVEDENNOM POSLE PREDVARITEL'NOGO VOZDEISTVIIA STRESSA]
V. S. IAKUSHEV, V. V ZHEZHA, and V V. DAVYDOV (Orenburgskii Meditsinskii Institut, Orenburg, USSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol 28, Nov.-Dec. 1982, p 94-96. In Russian. refs

The effect of emotional and painful stress on glycolysis in the heart during myocardial necrosis is studied in rats. Results show that 2 and 7 days following the application of emotional and painful stress the rate of glycolysis in the functioning area of the left ventricle of the heart decreased after the development of ischemic necrosis of the myocardium This change corresponds to the pattern of the aftereffects of stress on an organism. The role of glycolysis as an important adaptation mechanism during stress was decreased due to the effects of ischemic necrosis of the myocardium, which led to a compensatory hyperfunction of the nonimpaired heart segments. N.B.

A83-33340
THE PHASIC NEURON REACTIONS OF THE VISUAL CORTEX TO FLASHES OF LIGHT IN VARIOUS CONDITIONS OF STIMULATION [FAZNYE REAKTSII NEIRONOV ZRITEL'NOI KORY NA VSPYSHKU SVETA V RAZNYKH USLOVIIAKH STIMULIATSII]
L. P IAKUPOVA (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Zhurnal Vysshei Nervnoi Deiatel'nosti (ISSN 0044-4677), vol 32, Nov -Dec 1982, p 1140-1148 In Russian. refs

A comparison of the phasic neuronal reactions of the visual cortex to diffuse flashes of light in various stimulation conditions is conducted using rabbits in conditions of quiet wakefulness Results show that the majority of the activation phases (AP) in the reactions of various neurons of the visual cortex to diffuse light flashes occur independently from each other in two time intervals after the stimulus. early (20-40 ms) and late (190-250 ms) phases. The character of the temporal distribution of the late AP of the visual cortex changes in the aftereffect of reticular stimulation, while fewer changes are noted for the early phases. Differences were also noted in the distribution of the AP in the neuronal responses of different cortical layers which were not observed in the aftereffect of reticular stimulation. N.B

N83-23835# National Research Council of Canada, Ottawa (Ontario).
THE PROSPECTS FOR THE APPLIED GENETIC ENGINEERING OF YEAST
H. VANKEULEN and D Y. THOMAS *In* Midwest Research Inst Biotechnol. for the Production of Chem. and Fuels from Biomass p 17-30 Dec 1982 refs
Avail: NTIS HC A09/MF A01

The possibilities for genetically engineering into the yeast Saccharomyces cerevisiae new genes for the utilization of carbohydrates were examined The present status of cloning vectors for yeast and their properties are reviewed The development of methods for cloning new genes into yeast are

described The desirable features for the development of genetically modified yeasts for industry are discussed. E.A.K

N83-24135*# National Aeronautics and Space Administration, Washington, D. C.
CHANGES OF NUCLEIC ACIDS OF WHEAT SEEDLINGS UNDER SPACEFLIGHT CONDITIONS
K. M SYTNYK and L. I. MUSATENKO 12 May 1983 6 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk Ukrainskoy RSR, Ser. B., Geol. Khim. i Biol. Nauki (USSR), no. 12, 1980 p 76-78
(Contract NASW-3451)
(NASA-TM-77200; NAS 1.15 77200) Avail NTIS HC A02/MF A01 CSCL 06C

The effects of space flight on the growth of wheat seedlings and their nucleic acid content were studied It was shown that both space and ground seedlings have almost the same appearance, dry weight and nucleic acid content in the root, coleoptile and leaves The only difference found is in the RNA and DNA content, which is twice as much in the ground seedling apices as in the space-grown seedlings. Author

N83-24136*# National Aeronautics and Space Administration, Washington, D. C
LIFE IN MOTION, IN MOTION!
Y. A KOVALENKO Mar. 1983 7 p Transl into ENGLISH from Zdorovye (Moscow), no. 5(317), 1980 p 7-8
(Contract NASW-3541)
(NASA-TM-77202, NAS 1.15:77202) Avail: NTIS HC A02/MF A01 CSCL 06C

A 120 day limited mobility experiment with young male rats and its results, including retarded growth and degenerative changes in the cardiac muscle, are described A 120 day strict bedrest experiment with 10 human volunteers and its results are described and discussed Early subjective complaints, subsequent adaptation and eventual progressive changes in excitability and reactivity, reduction in functional capability of the cerebral cortex, and disturbances in water-salt, protein and fat metabolism, including development of precursors of atherosclerosis, as well as poor results of the orthostatic test after 4 months, are presented. These results are explained as applied to sedentary workers and recommendations are given for such persons to exercise in the morning, at work and in the evening in order to prevent hypokinesis and its physical, mental and physiological effects. Author

N83-24137# Colorado Univ., Denver
AUDITORY EVOKED MAGNETIC FIELDS: A REPLICATION WITH COMMENTS ON THE MAGNETIC P50 ANALOG Interim Technical Report, Nov. 1981 - Oct. 1982
J. T. ZIMMERMAN, M. REITE, J E ZIMMERMAN, and J. EDRICH 12 Oct. 1982 13 p refs Presented at 4th Intern. Workshop on Biomagnetism, Rome, Sep. 1982
(Contract N00014-79-C-0383)
(AD-A121621, ITR-7) Avail: NTIS HC A02/MF A01 CSCL 06P

Auditory evoked magnetic fields (AEFs) and EEG auditory evoked potentials (AEPs) were recorded from left and right auditory cortical regions of 12 normal adult subjects. The magnetic sensor was a figure-eight SQUID gradiometer with a 4 cm baseline oriented so as to be maximally sensitive to a current dipole oriented normal to the Sylvian fissure. Stimuli were 100 msec long 1 kHz tone pips with a modal interstimulus interval of 700 msec delivered at sound pressure levels of 40, 60, 80, and 100 dB. AEF amplitude was found to be related to stimulus intensity in a quadratic fashion, AEP amplitude in a linear fashion. AEFs were of larger amplitude in response to contralateral as compared to ipsilateral stimulation. AEPs did not exhibit such a relationship In a second experiment right hemisphere AEFs and AEPs in response to contralateral ear stimulation tone in these 12 subjects were combined with similar previous data from 24 subjects, providing a total of 36 subjects, to examine the comparability of the AEP P50 waveform and the AEF P50 analog. The latency of the P50 was found to decrease as a function of increasing stimulus intensity for both AEFs and AEPs but the P50 latency was consistently shorter in magnetic compared to potential recordings GRA

N83-24138# Naval Biodynamics Lab., New Orleans, La.
ANALYSIS OF SENSORY EVOKED POTENTIALS USING NORMALIZED CROSS-CORRELATION FUNCTIONS AND POLYEXPONENTIAL REGRESSION
M. D BERGER Jul. 1982 27 p refs
(AD-A121726, NBDL-81R003; NBDL-82R015) Avail: NTIS HC A03/MF A01 CSCL 06S

Somatosensory evoked potentials (EPs) produced by stimulation of the dorsal columns were recorded from the cervico-medullary junction of adult Rhesus, and were analysed using normalized cross-correlation functions (NCCFs), simple peak-detection, and RMS amplitude measurement. The NCCF provided measures of latency shift and waveshape change, while the more traditional peak-detection method provided measures of peak latency and peak amplitude. The results of these procedures were plotted as functions of time relative to a single, brief experimental manipulation (impact acceleration of the whole body). Analysis by means of the NCCF was found to be versatile and effective technique, the advantages of which include measurement of latency shifts with little contamination by moderate changes in waveshape, quantification of subtle waveshape changes, and usefulness under a wide variety of noise conditions Polyexponential regression analyses were performed on selected plots and were found to be an effective means of reducing of these data GRA

N83-24139# Undersea Medical Society, Inc , Bethesda, Md
EFFECT OF CO2 ON MAMMALIAN ORGANISMS
E. B. BROWN, ed. (Oral Roberts Univ), C. D. GULL, ed (Gull (Cloyd Dake) and Associates, Inc), and C B CARISTON, ed Dec 1982 113 p refs Workshop held in Bethesda, Md., 5-6 Jun 1980
(Contract DE-FG05-80EV-10321)
(DE83-004441, CONF-8006249) Avail: NTIS HC A06/MF A01

The effects of CO2 on mammalian tissue was addressed, including such areas of focus as, increased concentrations of CO2 on plants, elevated CO2 levels in the air breathed by mammals, and the possible carcinogenic properties of very high concentrations of CO2 in the external environment of organs and tissues.

N83-24140# Department of Energy, Washington, D C. Carbon Dioxide and Climate Research
THE INTERESTS OF THE DEPARTMENT OF ENERGY IN THE EFFECTS OF CO2 ON MAMMALIAN ORGANISMS
R. DAHLMAN *In* Undersea Medical Society, Inc. Effect of CO2 on Mammalian Organisms 9 p Dec 1982
Avail NTIS HC A06/MF A01

The prospect that carbon dioxide from the unrestrained combustion of fossil fuels may be potentially the most important environmental issue facing mankind Current predictions call for a doubling of atmospheric carbon dioxide as early as 2030. Climate models, using these elevated levels, predict the possibility of significant dislocations in the global distribution of climate. Should such perturbations in the distribution of global temperature, cloudiness, precipitation, and wind occur, then it is clear that there could be major changes in the global physical characteristics of the oceans, and in the extent of the cryosphere. Author

N83-24142# Rutgers Univ , New Brunswick, N J Dept of Horticulture and Forestry.
METABOLIC EFFECTS OF CO2 IN PLANT TISSUES
C FRENKEL *In* Undersea Medical Society, Inc. Effect of CO2 on Mammalian Organisms 3 p Dec. 1982 refs
Avail: NTIS HC A06/MF A01

Carbon dioxide has been shown extensively to influence postharvesting nonphotosynthetic plant tissue growth and development, including cell divison, growth promotion, root development, seed germination, fruit ripening, improvement of crop storage, and other processes. The metabolic action of CO2 is of additional interest, particularly because high concentrations of the gas lead to metabolic abnormalities and damage to tissues - for example, lesions and browning and loss of quality in fruits and vegetables. Author

N83-24149# Florida State Univ., Tallahassee
RADIATION-INDUCED EFFECTS IN ORGANIC SYSTEMS Final Report
R. H. JOHNSEN 30 Sep. 1982 11 p refs
(Contract DE-AS05-76ER-02001; EY-76-5-05-2001)
(DE83-005056, DOE/ER-02001/T1) Avail: NTIS HC A02/MF A01

Processes involved in the absorption and distribution of high-energy radiation in organic molecules are discussed. The gross chemical effects of radiation in a number of important classes of organic compounds including alcohols, aliphatic acids, aliphatic hydrocarbons, and aromatic hydrocarbons were studied. Basic information was acquired that has led to a better understanding of the effects of high-energy radiation on condensed media. The so-called protective effect of low concentrations of aromatic hydrocarbons was also studied. A contribution of lasting significance was the development of a technique for the post-radiolysis analysis of trapped free radicals by photochemical means Charge-exchange processes, ionization efficiencies (w-values), radical decay process in solids and ion-dissociation reactions were studied, the first by means of a modified time-of-flight mass spectrometer, the second utilizing an ionization chamber, the third using electron spin resonance detection, and the last involving the use of a dual mass spectrometer. DOE

N83-24150# Vanderbilt Univ., Nashville, Tenn. Dept. of Radiology
BIOMEDICAL COMPUTING TECHNOLOGY INFORMATION CENTER (BCTIC) Progress Report, 1 Dec. 1981 - 30 Nov. 1982
30 Jul. 1982 37 p refs
(Contract DE-AS05-80EV-10343)
(DE82-020926, DOE/EV-10343/32) Avail: NTIS HC A03/MF A01

Details of the operation of a biomedical computing information center are given Several computer programs are described. Computer programs on chromatography, statistical analysis, and hormone-receptor binding are among those discussed DOE

N83-24151# Moshman Associates, Inc , Bethesda, Md.
ALTERNATIVE STRATEGIES FOR DEVELOPING RELIABLE ESTIMATES OF NATIONAL ACADEMIC BASIC RESEARCH EXPENDITURES BY FIELD OF SCIENCE AND ENGINEERING Final Report, 1981 - 1982
D. E. TREVETT and J MOSHMAN Jun 1982 40 p
(Contract NSF SRS-81-14521)
(PB83-132779) Avail: NTIS HC A03/MF A01 CSCL 05A

The contractor researched and evaluated alternative approaches for gathering data with sufficient reliability to generate estimates of basic research expenditures, at disaggregated science and engineering levels from the 500 to 600 academic R and D performers A wide range of contacts were made to evoke and discuss all suggestions and comments. The study recommended using existing university computerized recordkeeping systems and that by informing institutions sufficiently in advance of needed information, the basic research expenditures query could be made a part of the annual NSF Survey of Scientific and Engineering Expenditures at Universities and Colleges. GRA

N83-24152# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 31
13 Apr. 1983 112 p refs Transl. into ENGLISH from various Russian articles
(JPRS-83247) Avail: NTIS HC A06

Several areas of biomedical and behavioral sciences were addressed, including agrotechnology, biochemistry, genetic engineering, laser effects, physiology, and public health.

N83-25343*# Oklahoma State Univ., Stillwater. Dept of Botany and Microbiology.
MICROBIAL ECOLOGY OF EXTREME ENVIRONMENTS: ANTARCTIC DRY VALLEY YEASTS AND GROWTH IN SUBSTRATE-LIMITED HABITATS Progress Report, 1 Dec. 1981 - 31 Aug. 1982
H S VISHNIAC 31 Aug 1982 23 p refs
(Contract NAGW-26)
(NASA-CR-170332; NAS 1 26:170332) Avail: NTIS HC A02/MF A01 CSCL 06C

The success of the Antarctic Dry Valley yeasts presumeably results from adaptations to multiple stresses, to low temperatures and susbstrate-limitation as well as prolonged resting periods enforced by low water availability. Previous investigations have suggested that the crucial stress is substrate limitation. Specific adaptations may be pinpointed by comparing the physiology of the Cryptococcus vishniacii complex, the yeasts of the Tyrol Valley, with their congeners from other habitats. Progress was made in methods of isolation and definition of ecological niches, in the design of experiments in competition for limited substrate, and in establishing the relationships of the Cryptococcus vishniacii complex with other yeasts. In the course of investigating relationships, a new method for 25SrRNA homology was developed. For the first time it appears that 25SrRNA homology may reflect parallel or convergent evolution. Author

N83-25344*# Alabama Univ., Birmingham. Dept. of Biochemistry.
THE CHEMICAL BASIS FOR THE ORIGIN OF THE GENETIC CODE AND THE PROCESS OF PROTEIN SYNTHESIS Annual Report
16 Jun. 1982 26 p refs
(Contract NGR-01-010-001)
(NASA-CR-170334; NAS 1.26:170334) Avail. NTIS HC A03/MF A01 CSCL 06C

The major thrust is to understand just how the process of protein synthesis, including that very important aspect, genetic coding, came to be Two aspects of the problem: the chemistry of active aminoacyl species; and affinities between amino acids and nucleotides, and specifically, how these affinities might affect the chemistry between the two are stressed. Author

N83-25345# Systems Research Labs., Inc., Dayton, Ohio.
BEHAVIORAL AND PHYSIOLOGICAL EFFECTS OF PSYCHOLOGICAL STRESS IN RATS Final Report, Oct. 1980 - Dec. 1981
J. LANUM, M. E. CAMPBELL, D. W BLICK, T. G. WHEELER, and J. T YATES Brooks AFB, Tex School of Aviation Medicine Nov. 1982 56 p refs
(Contract F33615-80-C-0603, AF PROJ. 7757)
(AD-A123428, SAM-TR-82-34) Avail NTIS HC A04/MF A01 CSCL 06C

As compared with controls, albino rats stressed by being held immobile for up to 18 hours show behavioral decrements in an open-field activity maze and in two-way shuttle-box avoidance acquisition. The severity of the decrement was increased with increased restraint duration. Males showed greater decrements than females, especially at shorter restraint times No differences in adrenal weights were associated with the experimental conditions, but the presence of stomach lesions was positively correlated with stress duration and the severity of the behavioral decrement. Author (GRA)

52

AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

A83-30093
THE PROBLEM OF SUDDEN CORONARY DEATH IN THE LIGHT OF MATHEMATICAL CATASTROPHE THEORY [PROBLEMA VNEZAPNOI KORONARNOI SMERTI V SVETE MATEMATICHESKOI TEORII KATASTROF]
I. F. OBRAZTSOV, G. G AVTANDILOV, and A. S. VOLMIR (Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol 268, no 6, 1983, p 1338-1341. In Russian. refs

A mathematical model is developed for the hemodynamic processes connected with the elastic deformations of the blood vessels and their 'transient buckling' (catastrophe) which are involved in sudden coronary death A comparative analysis is presented of the processes involved in myocardial infarctions and in sudden coronary death. The behaviors of the dynamic systems are expressed in graphical form. The basic biomechanical aspects of the initial processes occurring in sudden coronary death are examined N B.

A83-30302
PHYSIOLOGICAL MECHANISMS FOR FATIGUE FORM STRENUOUS MUSCULAR ACTIVITY [FIZIOLOGICHESKIE MEKHANIZMY UTOMLENIIA PRI NAPRIAZHENNOI MYSHECHNOI DEIATEL'NOSTI]
V D. MONOGAROV (Kievskii Institut Fizicheskoi Kul'tury Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 29, Mar.-Apr. 1983, p. 192-199 In Russian. refs

The roles played by tissue hypoxia, the accompanying shifts in homeostasis, and the intensification of respiration and blood circulation in the onset of fatigue and in counteracting fatigue during strenuous muscular actvity are elucidated It is shown that progressive tissue hypoxia and shifts in homeostasis are precursors of fatigue. The principal physiological mechanisms for partially counteracting fatigue and maintaining a high level of efficiency are determined. These are changes in the electrical activity of the working muscles, a shift in the way the muscles participate in the motor act, a shift in the functions of motor units and the inclusion of auxiliary motor units with a higher threshold of excitation, and intensified respiration and blood circulation, which increase the amount of oxygen delivered and compensate for tissue hypoxia C.R

A83-30426
INFORMATION PROCESSING IN THE VISUAL SYSTEM: HIGHER VISUAL FUNCTIONS [PERERABOTKA INFORMATSII V ZRITEL'NOI SISTEME: VYSSHIE ZRITEL'NYE FUNKTSII]
V. D. GLEZER, ED. (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Leningrad, Izdatel'stvo Nauka, 1982, 168 p. In Russian.

A collection of articles is presented concerning research on problems of information processing in higher sections of the visual system which is devoted to studies of the signals used for the description of visual images and the mechanisms of their perception. Topics discussed include the organization and function of the receptive field of neurons of the visual cortex; spatial-frequency filtering in the visual system; mechanisms of the description of the form of images, their orientation, color, location, and other properties, and the participation of various cortical regions and interhemispherical differences in the description of images Several different methods are employed in these investigations, including microelectrode studies of the neurons of the visual cortex and psychophysiological studies of the visual functions in humans. For individual items see A83-30427 to A83-30443 N.B.

A83-30429
THE IDENTIFICATION OF ORIENTATION AT THE THRESHOLD OF LINE DETECTORS [OPOZNANIE ORIENTATSII NA POROGE OBNARUZHENIIA LINII]
A. VASILEV, B. SIMEONOVA, and M. ZLATKOVA (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria) IN. Information processing in the visual system Higher visual functions Leningrad, Izdatel'stvo Nauka, 1982, p. 35-40 In Russian. refs

The dependence of the orientational selectivity on the length of presented lines is studied in psychophysiological experiments. It is shown that at the threshold of the display of a stimulus, the orientational selectivity depends on the length of the line: for a short line (10 min) an angular difference of 40-50 degrees is needed for the errorless identification of orientation; while for a line with a length of 20 min, this difference becomes about 15 degrees and does not decrease with further increases in the length of the stimulus up to 1 degree 15 min. It is suggested that the distinction in orientation greater than 15 degrees (for long stimuli and in conditions where one of the orientations is vertical) is determined with the aid of independent innate mechanisms. The interaction of individual detectors is necessary for finer discriminations, which requires a superthreshold level of stimulus In experiments with various benchmark orientations for stimuli of a 1 degree 15 min length, a worsening of the orientational selectivity is observed during the removal of the benchmark orientation from the vertical and horizontal N B

A83-30430
THE INTERACTION BETWEEN DETECTORS OF LINE ORIENTATIONS [VZAIMODEISTVIE MEZHDU DETEKTORAMI ORIENTATSII LINII]
A. PENCHEV and B. STOIMENOVA (Meditsinska Akademiia, Sofia, Bulgaria) IN· Information processing in the visual system Higher visual functions Leningrad, Izdatel'stvo Nauka, 1982, p 40-45. In Russian. refs

The thresholds of the determination of the orientation for one, two, and three identically oriented lines are studied during their various distributions. Higher thresholds than expected for the case of probability summation are obtained for those variants of the distribution of two and three lines where the distance between parallel lines does not exceed 14 min. It is suggested that this finding can be explained by the existence of a mutually inhibiting effect between individual line-detectors N B.

A83-30431
SPATIAL ADAPTATION AND LINE DETECTORS [PROSTRANSTVENNAIA ADAPTATSIIA I OBNARUZHENIE LINII]
A. VASILEV, M. ZLATKOVA (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria), and N. NEIKOV (B'lgarska Akademiia na Naukite, Edinen Tsent'r po Biologiia, Sofia, Bulgaria) IN: Information processing in the visual system Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p. 45-50. In Russian. refs

The thresholds were measured in conditions of foveal stimulation for the detector of narrow testing lines presented in the middle of an adapted background of rectangular form with a width from 1.3-26 0 min. Increasing the width of the background strip led at first to an increase of the threshold, and then to its decrease, while the effect was more strongly expressed on a bright background. It is proposed that the detected dependences reflect spatially organized mechanisms which participate in the stimulus detection, as well as the change of this organization depending on the level of the background brightness. The basic elements of the control are the central-zone which lowers the sensitivity and the effect of the periphery which is antagonistic to it. With a brighter background, an additional small effect from a further removed segment is revealed which acts against the periphery effect N.B.

A83-30432
THE SPATIAL FREQUENCY AND THE TEMPORAL CHARACTERISTICS OF MASKING [PROSTRANSTVENNAIA CHASTOTA I VREMENNYE KHARAKTERISTIKI MASKIROVKI]
D. MITOV, A. NEVSKAIA, A. VASILEV, and V MANAKHILOV (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria, Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) IN Information processing in the visual system Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p 51-62. In Russian. refs

The temporal functions of masking are studied for various combinations of the values of the spatial frequency (SF) of stimuli. It is shown that for low and medium values of the SF of the maskers (2 and 6 cycles/deg), the functions of masking are phasic and tonic, while for large values (18 cycles/deg) they are tonic When the masking SF is smaller than the testing SF, 40-60 msec before turning off the masking a sharp decrease in the masking effect is observed. The change in the contrast of masking exerts a significant effect on the degree of masking, whereas the shortening of its duration to 20 msec only slightly decreases the masking effect, which probably reflects the short-duration temporal summation for the masking stimulus. A grating with an SF of 6 cycles/deg, which evokes phasic and tonic masking, shows the presence of probability summation. Consequently, the criterion of the presence of summation is unilateral for deciding what system (tonic or phasic) detects the stimulus. The possible mechanisms of the phasic and tonic components of masking are examined N B.

A83-30433
THE IDENTIFICATION OF CLEAR AND DEFOCUSED IMAGES DURING SHORT PERIODS OF THE PRESENTATION OF VISUAL OBJECTS [OPOZNANIE CHETKIKH I DEFOKUSIROVANNYKH IZOBRAZHENII PRI KOROTKOM VREMENI PRED'IAVLENIIA ZRITEL'NYKH OB'EKTOV]
A PENCHEV and A. KURTEV (Meditsinska Akademiia, Sofia, Bulgaria) IN. Information processing in the visual system Higher visual functions Leningrad, Izdatel'stvo Nauka, 1982, p 62-67. In Russian refs

A83-30434
SPATIAL FREQUENCY AND THE TEMPORAL CHARACTERISTICS OF THE PERCEPTION OF THE FORM OF COMPLEX GRATINGS [PROSTRANSTVENNAIA CHASTOTA I VREMENNYE KHARAKTERISTIKI VOSPRIIATIIA FORMY KOMPLEKSNYKH RESHETOK]
D. MITOV (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria) IN: Information processing in the visual system: Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p. 67-79. In Russian. refs

The temporal organization of the mechanism of decision making concerning the form of a stimulus is investigated. The method employed uses delays of the switch-on of high-frequency components of a complex grating in relation to the fundamental frequency or low-frequency components in relation to high frequencies (during variations of the absolute value of the frequencies and contrasts of various components). The results obtained are found to disprove the hypothesis that the mechanism of decision making concerning the form of the stimulus is a temporal summer. The data support the hypothesis of the successive separation of image features: first of features connected with the low-frequency components of the stimulus and, seocndly, of features connected with the high-frequency components N B

A83-30435
THE CHARACTERISTICS OF THE DISCRIMINATION OF GRATINGS DEPENDING ON THEIR SPECTRA [KHARAKTERISTIKI RAZLICHENIIA RESHETOK V ZAVISIMOSTI OT IKH SPEKTRA]
K. N DUDKIN (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), D MITOV, and M ZLATKOVA (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria) IN: Information processing in the visual system. Higher visual functions Leningrad, Izdatel'stvo Nauka, 1982, p 79-84. In Russian refs

The discrimination of rectangular gratings depending on their spatial frequency (SF) and width (or the number of cycles) is studied. During the presentation of identical gratings and gratings with SFs which differ by more than one octave, the percentage of correct responses is high and does not depend on the width of the grating. In the case of SF differences by an octave or less, a U-shaped dependence of the percentage of correct responses on the width of the grating is found It is proposed that two operators exist for the description of these gratings: a mechanism of periodicity evaluation for gratings with a large number of cycles and a mechanism of semiperiod evaluation for gratings with a small number of cycles. N.B.

A83-30436
THE EVALUATION OF SPATIAL FREQUENCY [OTSENKA PROSTRANSTVENNOI CHASTOTY]
D. MITOV (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria) IN Information processing in the visual system: Higher visual functions Leningrad, Izdatel'stvo Nauka, 1982, p. 84-94. In Russian refs

The evaluation by humans of the spatial frequency (SF) of sinusoidal and rectangular gratings is investigated. A monotonic linear relationship between the SF and its average evaluation is established as well as the absence of periodic oscillations in sigma values of this evaluation which are expressed in relative units (octaves) This indicates an analog description of SF in the visual system and the significant degree of the overlapping of the saptial-frequency characteristics of individual channels Scaling the SF reveals a logarithmic relationship between the physical and subjective values of the SF, while the constancy of the sigma evaluation in octaves at various values of SF indicates the logarithmic character of the indirect scale of evaluation. These results support a logarithmic function of the transformation of the physical metric of the SF into a subjective metric. N.B.

A83-30437
THE PERCEPTION OF THE COLOR OF A STIMULUS EQUAL IN BRIGHTNESS TO THE COLOR OF THE BACKGROUND - THE ASSIMILATION OF COLOR [VOSPRIIATIE TSVETA STIMULA, RAVNOGO PO IARKOSTI S TSVETOM FONA - ASSIMILIATSIIA TSVETA]
A V. BERTULIS, D S SAUDARGENE, and R I. TSITVARAS (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR) IN: Information processing in the visual system Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p 95-101 In Russian refs

It is found that the system of monocular vision is not capable of separating a colored object of small size from the background if the stimulus and background are equal in subjective brightness The observer does not perceive the boundaries and the color of the stimulus, but sees a uniform field which has the color of the background This effect, called the assimilation of color, is used in measuring the spectral sensitivity of the eye. A curve is obtained which has the same form as a curve of spectral sensitivity obtained by the threshold measurement method, and the curve obtained does not vary with changes in the color and brightness of the background, and in the form and size of the stimulus. It is concluded that the brightness difference facilitates color discrimination and the separation of a colored object from the background, while information about the contour of the stimulus does not play an essential role in the process of color discrimination. N.B.

A83-30438
OPTIMIZATION PROCESSES IN THE VISUAL PERCEPTION OF ORIENTATION [OPTIMIZATSIONNYE PROTSESSY V ZRITEL'NOM VOSPRIIATII ORIENTATSII]
N. IAKIMOV and L. MITRANI (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria) IN: Information processing in the visual system: Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p. 102-107. In Russian. refs

The ability of humans to attribute orientation to visible objects is investigated It is proposed that the perception of the orientation of two-dimensional objects is determined by the processes of optimization in the perception system which distinguish a specific line or segment and, thus, causes the perception of orientation Results are presented concerning the evaluation of the orientation of an aggregate of random points It is found that the perception of the orientation corresponds to specific invariant characteristics of the aggregate of the points which possess clearly expressed extremal properties. N.B

A83-30441
THE INVARIANCE OF VISUAL IDENTIFICATION IN THE RIGHT AND LEFT HEMISPHERES OF THE HUMAN BRAIN [INVARIANTNOST' ZRITEL'NOGO OPOZNANIIA V PRAVOM I LEVOM POLUSHARIIAKH MOZGA CHELOVEKA]
L I LEUSHINA, A A NEVSKAIA, M B PAVLOVSKAIA, and E A. VERSHININA (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) IN: Information processing in the visual system Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p. 135-148 In Russian refs

The capability of the hemispheres for the invariant identification of a form during variations of the image by location and size are compared It is found that one hemisphere (the left in the majority of subjects) gives a description of image form that is invariant to the size and location; whereas the other hemisphere gives a description that is correspondingly noninvariant although invariance in this hemisphere can be developed through training It is concluded that the different hemispheres of the brain use two different methods of visual-information processing. a classification method and a structural method N.B

A83-30442
PURSUIT EYE MOVEMENTS - MOVEMENT OF SERVOMOTOR TYPE OR PREPROGRAMMED MOVEMENTS? [PROSLEZHIVAIUSHCHIE DVIZHENIIA GLAZ - DVIZHENIIA SERVOMOTORNOGO TIPA ILI ZARANEE PROGRAMMIROVANNYE?]
L. MITRANI, G. DIMITROV, and N BOCHEVA (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria) IN: Information processing in the visual system: Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p. 148-153 In Russian.

Quantitative data are obtained concerning the moment of appearance of the first jump during pursuit eye movemnts. A clear dependence of the latent appearance of the first jump on the speed of the stimulus movement is found. The latency is determined by two components: the first component depends on the speed of the stimulus movement while the second is constant. These results indicate that pursuit eye movements are preprogrammed and are not of the servomotor type. The presence of the threshold distance that the stimulus travels for the origin of pursuit eye movements is experimentally determined. This threshold depends on the speed of the stimulus. N B.

A83-30443
PURSUIT EYE MOVEMENTS AND THE LOCALIZATION OF BRIEF VISUALLY PERCEIVED EVENTS [PROSLEZHIVAIUSHCHIE DVIZHENIIA GLAZ I LOKALIZATSIIA KRATKOVREMENNYKH ZRITEL'NO VOSPRINIMAEMYKH SOBYTII]
S MATEEV (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria) IN. Information processing in the visual system: Higher visual functions . Leningrad, Izdatel'stvo Nauka, 1982, p. 153-162 In Russian. refs

It is found that the number of errors during pursuit eye movements of a brief visual stimulus rises with increase in the speed of the pursuit and a decrease in the force of the stimulus. The errors also depend on the indeterminacy of the place at which the stimulus is presented and declines with decreases in this indeterminacy A model is developed which describes the localization as a process in which information about the location of the stimulus on the retina and information about the current angle of the turning of the eye are taken into account. Errors during localization are explained as the result of unequal time lags in the transmission of these data. N B

A83-30451
LACTATE ACCUMULATION RELATIVE TO THE ANAEROBIC AND RESPIRATORY COMPENSATION THRESHOLDS
J. SIMON, J. L. YOUNG, B. GUTIN, D. K BLOOD, and R B CASE (Columbia University, New york, NY) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Jan 1983, p 13-17. refs

Anaerobic thresholds of five male subjects were determined invasively (ATi), from a marked increase in plasma lactate above resting levels (Delta La), and noninvasively (ATn), from a nonlinear increase in minute ventilation (VE) during incremental work (IW) leg cycling tests; work rate was increased 30 W every 2 min Each subject also performed four constant-load work (CLW) tasks just above and just below their ATn and respiratory compensation threshold (RCT), i e , the point expressed as O2 consumption VO2 or work rate, at which VE increases disproportionally to CO2 output during IW In four of the five subjects that ATn preceeded the ATi during IW. Yet the ATn delineated the CLW in which marked lactate accumulation did or did not occur. During CLW just above the ATn in these same four subjects, VE/VO2 and fractional expired O2 peaked well before Delta La plateaued These findings suggest that exercise hyperventilation is not necessarily proportional to increases in plasma lactate Author

A83-30452
BLOOD LACTATE THRESHOLD IN SOME WELL-TRAINED ISCHEMIC HEART DISEASE PATIENTS
E. F. COYLE, W H MARTIN, A. A EHSANI, J. M HAGBERG, S. A BLOOMFIELD, D. R. SINACORE, and J. O. HOLLOSZY (Washington University, St. Louis, MO) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Jan. 1983, p. 18-23. refs
(Contract NIH-HL-22215)

A83-30455
REGULATION OF GLYCOGENOLYSIS IN HUMAN MUSCLE IN RESPONSE TO EPINEPHRINE INFUSION
D CHASIOTIS, K. SAHLIN, and E. HULTMAN (Huddinge University Hospital, Huddinge, Sweden) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Jan. 1983, p. 45-50 Research supported by the Swedish National Association Against Rheumatism and Medicinska Forskningsradet. refs
(Contract MF PROJECT 2647)

A83-30456
EFFECT OF HYPEROXIA ON METABOLIC AND CATECHOLAMINE RESPONSES TO PROLONGED EXERCISE
E. T. HOWLEY, R. H. COX, H G. WELCH, and R P. ADAMS (Tennessee, University, Knoxville, TN) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Jan. 1983, p. 59-63. Research supported by the East Tennessee Heart Association and University of Tennessee. refs
(Contract NIH-HL-06036-01)

A test is presented of the hypothesis that the lower gas exchange ratios (R) which have been observed in during prolonged work in humans breathing gas mixtures with an oxygen fraction in excess of 0.3 are due to a lower plasma catecholamine concentration caused by the hyperoxia The changes in plasma epinephrine and norepinephrine were measured when the subjects were switched from breathing air to 60 percent O2 (and vice versa) during 40 min of cycle ergometer exercise at 67 percent of maximal oxygen uptake.The subjects breathed one gas mixture for the first 30 min and were switched to the other in the last 10 min, while the order was reversed in a second test. The switch in gas mixtures from air to 60 percent O2 is found to result in a significant reduction in R, heart rate, minute ventilation, blood lactate concentration, and plasma epinephrine concentration, while the plasma norepinephrine concentration and the plasma free fatty acid concentration were not significantly changed. The direction of the epinephrine change was consistent with the change in R, although the epinephrine change was quantitatively small These results indicate a direct effect of PO2 on cellular metabolism as one cause of the change in R when the subjects were switched from air to 60 percent O2. N.B.

A83-30458
DETERMINATION OF MAXIMAL AEROBIC POWER DURING UPPER-BODY EXERCISE
M. N. SAWKA, M E. FOLEY, N A. PIMENTAL, M. M. TONER, and K. B. PANDOLF (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Jan. 1983, p. 113-117 refs

The effectiveness of four protocols is evaluated for eliciting maximal aerobic power (peak VO2) during arm-crank exercises. Comparisons were made between a continuous (C) and an intermittent (I) protocol employing a crank rate of 50 rpm, as well as among the C protocols employing crank rates of 30, 50, and 70 rpm No significant differences were found between the C and I protocols for peak VO2, maximal pulmonary ventilation (VE-max), maximal heart rate (HR-max), or maximal blood lactate (LA-max) responses. Results for the second group of experiments showed that in comparison to the C-50 protocol, significantly higher peak VO2 (+10 percent) and VE-max (+14 percent) responses were elicited by the C-70 protocol, while significantly lower peak VO2 (-11 percent), VE-max (-23 percent), HR-max (-8 percent), and LA-max (-29 percent) responses were elicited by the C-50 protocol. It is concluded that of the arm-crack protocols examined, the combination of a continuous design and a crank rate of 70 rpm provided the most effective protocol to elicit peak VO2 values.
N B.

A83-30459
BLOOD OSMOLALITY IN VITRO - DEPENDENCE ON P(CO2), LACTIC ACID CONCENTRATION, AND O2 SATURATION
D. BOENING and N. MAASSEN (Hannover, Medizinische Hochschule, Hanover, West Germany) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Jan. 1983, p 118-122. refs

A83-30460
BLOOD OSMOLALITY DURING IN VIVO CHANGES OF CO2 PRESSURE
D. BOENING, U. VAAS, and K.-M. BRAUMANN (Hannover, Medizinische Hochschule, Hanover, West Germany) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Jan. 1983, p. 123-129. refs

A83-30462
EFFECTS OF HYPERCAPNIA, HYPOXIA, AND REBREATHING ON HEART RATE RESPONSE DURING APNEA
Y. C. LIN, K K. SHIDA, and S. K. HONG (Hawaii, University, Honolulu, HI, New York, State University, Buffalo, NY) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Jan 1983, p. 166-171. Research supported by the Hawaii Heart Association. refs
(Contract NOAA-NA-79AAD00085; NOAA-NA-81AAD00070)

Breath-hold (BH) experiments were conducted on eight male subjects in order to determine the effects of apnea per se, hypercapnia, and hypoxia on the development and maintenance of BH bradycardia. Face immersion at room temperature was used to achieve BH of 90 s in duration. The attenuating effect of respiratory activity was determined by comparison of heart rate (HR) responses between the continuous BH with air and that interrupted every 15 s by rebreathing without improving the alveolar gas composition. The difference in HR responses between two series of BH with O2 in which hypoxia was not present and rebreathing was common to both was used to calculate the hypercapnic effect. The effect of hypoxia was determined by obtaining the difference between the total bradycardial response (continuous BH) and the summed effects of hypercapnia and apnea per se. Results show that apnea and hypoxia reduced the HR by 19 and 18 percent, respectively, from the pre-BH value, and hypercapnia increased HR by 6 percent from the pre-BH level, which accounts for the total 31 percent reduction in HR in a continuous BH. N.B.

A83-30463
EFFECTS OF HYPERCAPNIA, HYPOXIA, AND REBREATHING ON CIRCULATORY RESPONSE TO APNEA
Y. C. LIN, K K. SHIDA, and ONG , S. K. (Hawaii, University, Honolulu, HI, New York, State University, Buffalo, NY) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Jan. 1983, p. 172-177. Research supported by the Hawaii Heart Association. refs
(Contract NOAA-NA-79AAD00085; NOAA-NA-81AAD00070)

The cardiovascular responses to the cessation of respiration and to progressive hypoxia and hypercapnia were determined noninvasively in eight male subjects. Each subject performed a total of five 90 s breath holds (BH) with face immersion. A continuous BH was used to eliminate the circulatory effects of respiratory movements, BH with air or with O2 with rebreathing at 15 s intervals through a CO2 scrubber reduced the effect of hypercapnia, and BH with air or with O2 with rebreathing at 15 s intervals bypassing the CO2 scrubber produced hypercapnia with or without concomitant hypoxia. Results show that the alveolar CO2 levels are correlated linearly and positively with stroke volume, heart rate, and cardiac output. No such relation is found to exist between alveolar O2 levels and these hemodynamic parameters. Thus, the cardiac output was prevented from falling during BH by rebreathing and hypercapnia during BH. These results indicate that hypercapnia and consequent acidosis, through enhanced sympathoadrenal release of catecholamines, is responsible for the compensatory stroke volume response. N.B.

A83-30465* Veterans Administration Hospital, Miami, Fla.
EFFECTS OF WATER IMMERSION ON PLASMA CATECHOLAMINES IN NORMAL HUMANS
M. EPSTEIN (U.S. Veterans Administration Medical Center, Miami, FL), G. JOHNSON (Miami, University, Miami, FL), and A. G. DENUNZIO (Upjohn Co., Kalamazoo, MI) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Jan. 1983, p. 244-248. Research supported by the U.S. Veterans Administration. refs
(Contract NAS9-15473)

An investigation was conducted in order to determine whether water immersion to the neck (NI) alters plasma catecholamines in normal humans. Eight normal subjects were studied during a seated control study (C) and during 4 hr of NI, and the levels of norepinephrine (NE) and epinephrine (E) as determined by radioenzymatic assay were measured hourly. Results show that despite the induction of a marked natriuresis and diuresis indicating significant central hypervolemia, NI failed to alter plasma NE or E levels compared with those of either C or the corresponding prestudy 1.5 hr. In addition, the diuresis and natriuresis was found to vary independently of NE. These results indicate that the response of the sympathetic nervous system to acute volume alteration may differ from the reported response to chronic volume expansion. N B.

A83-30467* Pennsylvania Univ., Philadelphia.
HUMAN RESPIRATION AT REST IN RAPID COMPRESSION AND AT HIGH PRESSURES AND GAS DENSITIES
R. GELFAND, C J. LAMBERTSEN, R. STRAUSS, J. M CLARK, and C. D. PUGLIA (Pennsylvania, University, Philadelphia, PA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Jan 1983, p. 290-303. refs
(Contract NIH-HL-08899-08; NIH-HL-08899-11; NSG-90011, N00014-67-A-0216-0026, N00014-76-C-0248, N00014-75-C-1124)

The ventilation (V), end-tidal PCO2 (PACO2), and CO2 elimination rate were determined in men at rest breathing CO2-free gas over the pressure range 1-50 ATA and the gas density range 0 4-25 g/l, during slow and rapid compressions, at stable elevated ambient pressures and during slow decompressions Progressive increase in pulmonary gas flow resistance due to elevation of ambient pressure and inspired gas density to the He-O2 equivalent of 5000 feet of seawater was found to produce a complex pattern of change in PACO2. It was found that as both ambient pressure and pulmonary gas flow resistance were progressively raised, PACO2 at first increased, went through a maximum, and then declined towards values near the 1 ATA level. It is concluded that this pattern of PACO2 change results from the interaction on ventilation of the increase in pulmonary resistance due to the elevation of gas density with the increase in respiratory drive postulated as due to generalized central nervous system excitation associated with exposure to high hydrostatic pressure. It is suggested that a similar interaction exists between increased gas flow resistance and the increase in respiratory drive related to nitrogen partial pressure and the resulting narcosis. N B.

A83-30468
HUMAN FRONTAL SWEAT RATE AND LACTATE CONCENTRATION DURING HEAT EXPOSURE AND EXERCISE
N. FELLMANN, G. GRIZARD, and J. COUDERT (Clermont-Ferrand I, Universite, Clermont-Ferrand, France) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Feb. 1983, p 355-360 refs

A83-30469
REGIONAL GAS DISTRIBUTIONS AND SINGLE-BREATH WASHOUT CURVES IN HEAD-DOWN POSITION
M. DEMEDTS, I. CLARYSSE, M. VERHAMME, M. MARCQ, and M. DE ROO (Kliniek voor Longziekten; Dienst voor Nucleaire Geneeskunde, Louvain, Belgium) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Feb. 1983, p 361-365. refs

A83-30470
METABOLIC AND CARDIORESPIRATORY RESPONSES TO HE-O2 BREATHING DURING EXERCISE
A. G. BRICE and H. G WELCH (Tennessee, University, Knoxville, TN) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Feb. 1983, p. 387-392. Research supported by the American Heart Association. refs
(Contract NIH-7088; NIH-GM-29888)

A83-30471* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DRINKING AND WATER BALANCE DURING EXERCISE AND HEAT ACCLIMATION
J. E GREENLEAF, P J. BROCK, L C. KEIL, and J. T. MORSE (NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field, CA) Journal of Applied Physiology. Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Feb. 1983, p 414-419. refs

The interactions between fluid intake and balance, and plasma ion, osmotic, and endocrine responses during dehydration produced by exercise in cool and warm environments during acclimation are explored Two groups of five male subjects performed 8 days of ergometer exercise in hot and thermoneutral conditions, respectively. The exercise trials lasted 2 hr each. Monitoring was carried out on the PV, osmotic, sodium, and endocrine concentrations, voluntary fluid intake, fluid balances, and fluid deficits A negative correlation was observed between the plasma sodium and osmolality during acclimation. The presence of hypervolemia during acclimation is suggested as a cause of drinking, while the vasopressin concentration was not found to be a significant factor stimulating drinking. Finally, the predominant mechanism in fluid intake during exercise and heat exposure is concluded to be the renin-angiotensin II system in the presence of reductions in total body water and extracellular plasma volumes. M.S K.

A83-30474
EFFECT OF GLYCOGEN DEPLETION ON THE VENTILATORY RESPONSE TO EXERCISE
G. J. F. HEIGENHAUSER, J. R. SUTTON, and N. L JONES (McMaster University, Hamilton, Ontario, Canada) Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Feb. 1983, p. 470-474. Research supported by the Ontario Heart Foundation and Medical Research Council of Canada. refs
(Contract MRC-MA-4234)

Ergometer trials were performed by five male subjects under control and reduced muscle glycogen conditions. It was hypothesized that reduced glycogen would leak to greater fatty acid utilization by the muscles, which would be accompanied by a lowered CO2 production rate. Biopsies were performed on the vastus lateralis muscle before and after graded ergometer trials performed to exhaustion The glycogen depletion trials were accompanied by a controlled diet. Monitoring was also carried out on respiration content and volume. Reduced glycogen due to diet and exercise was confirmed from the biopsies, and was correlated with a maximal power output lowered by an average of 14 percent. It is concluded that the glycogen content of the muscle before exercise determines the capacity to perform long-term heavy exercise and the ability to achieve maximum power output during short-term graded exercise. Finally, the VCO2 output was found to be similar in both normal and glycogen-depleted states. M.S.K

A83-30475
PLASMA VOLUME SHIFTS DURING PROGRESSIVE ARM AND LEG EXERCISE
D. S. MILES, M. N SAWKA, R. M GLASER, and J. S. PETROFSKY (Wright State University, Dayton, OH) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Feb. 1983, p. 491-495. Research supported by the Dayton Area Heart Association, American Heart Association, and U.S. Veterans Administration refs

A83-30476* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PLASMA VOLUME, RENIN, AND VASOPRESSIN RESPONSES TO GRADED EXERCISE AFTER TRAINING
V. A CONVERTINO, L C. KEIL, and J. E GREENLEAF (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) Journal of Applied Physiology· Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Feb 1983, p. 508-514. refs
(Contract NCA2-OR-180-703)

Four male subjects underwent a series of ergometer trials to test the hypothesis that training-induced hypervolemia produces a reduction in the relative change of plasma volume, vasopressin, and renin activity levels. Sitting ergometer exercise was performed for 2 hr per day for 8 consecutive days and the VO2 was monitored. A second phase involved a graded exercise and recording of the VO2 and HR, as well as the taking of blood samples to measure the plasma osmolality, the vasopressin content, and the renin activity The training was found to reduce the plasma volume levels for a given work load. Hypervolemia was induced by a training-produced plasma volume expansion The osmolality, vasopressin content, and renin activity increased with training A threshold work intensity of 50 percent was identified for changes in the osmolality and the stimulation of renin activity and vasopressin increase. The maintenance of a certain level of intensity during training is concluded necessary to stimulate the hypervolemic response. M.S K

A83-30477
BLOOD VOLUME AND PROTEIN RESPONSES TO SKIN HEATING AND COOLING IN RESTING SUBJECTS
M. H. HARRISON, R. J. EDWARDS, L. A. COCHRANE, and M. J GRAVENEY (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) Journal of Applied Physiology· Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, Feb. 1983, p 515-523. refs

Bass and Henschel (1956) observed that hemodilution seemed to represent an early response to heat stress, which was reversed once sweating began Yet, although several subsequent studies appear to have confirmed Bass and Henschel's findings, argument persists regarding whether hemodilution or hemoconcentration represents the 'normal' response to acute heat stress The present study has mainly the objective to determine the effects on the intravascular volume of alterations in cutaneous vasomotor and sudomotor activity induced by increasing and decreasing the core and skin temperatures of resting subjects. A related issue concerns whether the rate at which plasma proteins enter and leave the intravascular compartment is influenced by the alteration in blood volume occurring during thermal stress. With exercise, hemoconcentration appears to be associated with loss of protein, and hemodilution with gain. The possibility that a similar relationship exists at rest was examined in the present study G.R.

A83-30478
UNUSUAL CORE TEMPERATURE DECREASE IN EXERCISING HEART-FAILURE PATIENTS
F. G. SHELLOCK, S. A. RUBIN, A G ELLRODT, A. MUCHLINSKI, H BROWN, and H J. C. SWAN (Cedars-Sinai Medical Center, Los Angeles, CA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Feb. 1983, p. 544-550. refs

The presumption of body temperature elevation in exercising heart-failure patients has been commented on by numerous investigators. The present available literature implies that exercise hyperthermia may be extremely severe in heart-failure patients compared with normal individuals However, exercise thermoregulation has never been studied in this group The present investigation has, therefore, the objective to examine core and skin temperature changes in heart-failure patients performing short-term maximal exercise Sixteen patients with New York Heart Association class III or IV heart failure from either idiopathic cardiomyopathy or coronary artery disease were studied. The results of the investigation show that short-term maximal exercise in severe heart-failure patients in a comfortable environment is accompanied by a core temperature decrease throughout the exercise period This decrease in core temperature cannot be explained by conventional heat-loss mechanisms. The observations show exactly the opposite of what has been predicted G R

A83-30480
MUSCLE FIBER COMPOSITION AND BLOOD AMMONIA LEVELS AFTER INTENSE EXERCISE IN HUMANS
G. A. DUDLEY, R. S STARON, T F MURRAY, F C. HAGERMAN, and A LUGINBUHL (Ohio University, Athens, OH) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Feb. 1983, p. 582-586. refs

A83-30481
COUPLING OF VENTILATION TO PULMONARY GAS EXCHANGE DURING NONSTEADY-STATE WORK IN MEN
D H WASSERMAN and B J. WHIPP (Harbor-UCLA Medical Center, Torrance, CA) Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, Feb. 1983, p 587-593 refs
(Contract NIH-HL-11907)

A83-30484
ROLES OF STRESS AND ADAPTATION IN THE ELICITATION OF FACE-IMMERSION BRADYCARDIA
B. H. NATELSON, C. A. NARY, II, G. A. CURTIS, and D CREIGHTON (U.S. Veterans Administration Medical Center; New Jersey, University of Medicine and Dentistry, East Orange, NJ) Journal of Applied Physiology. Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, March 1983, p 661-665. Research supported by the U S. Veterans Administration. refs

A83-30487
EXERCISE TRAINING, SEX HORMONES, AND LIPOPROTEIN RELATIONSHIPS IN MEN
M. A B. FREY, B. M DOERR, L. S. SRIVASTAVA, and C. J GLUECK (Wright State University, Dayton, Cincinnati, University, Medical Center, Cincinnati, OH) Journal of Applied Physiology· Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, March 1983, p. 757-762. refs
(Contract NIH-RR-00068-20; NIH-RR-00068-2, NIH-N01-HV-2-2914L)

An experimental study was conducted to determine whether, and to what extent, changes in high density lipoprotein cholesterol (HDLC) during exercise could be mediated by changes in testosterone and estrogen in men. Twelve men in the 18-32 year age group participated in the present bycicle ergometer training program. Despite the training effect, there was no significant HDLC increase and no decrease in fasting plasma triglycerides; low density lipoprotein cholesterol and total cholesterol, however, fell. Testosterone, total testosterone and estrone were positively correlated with HDLC after the training program It is speculated that changes in endogenous testosterone and estrogens may mediate the HDLC increases reported after exercise training programs in men O.C

A83-30491
TIME COURSE OF POSTHYPERVENTILATION BREATHING IN HUMANS DEPENDS ON ALVEOLAR CO2 TENSION
H. FOLGERING and M. DURLINGER (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, March 1983, p. 809-813. refs

A83-30492
IMPAIRED RED CELL FILTERABILITY WITH ELIMINATION OF OLD RED BLOOD CELLS DURING A 100-KM RACE
W. H. REINHART, M. STAUBLI, and P W STRAUB (Bern, Universitaet, Berne, Switzerland) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, March 1983, p. 827-830. refs

Centrifuged hematocrit, plasma protein and serum sodium, reticulocytes, red cell filterability, creatine and 2,3-diphosphoglyceric acid were measured in 22 well trained runners, first immediately after a 100-km rece, and then 10 days afterward, for control The impaired red cell filterability after the race, in comparison with control values, indicates mechanical and/or metabolic damage to red blood cells which may lead to splenic sequestration and hemolysis of preferentially older cells. O C.

A83-30493
ROLE OF SURFACE AREA-TO-MASS RATIO AND WORK EFFICIENCY IN HEAT INTOLERANCE
Y EPSTEIN, Y. SHAPIRO, and S. BRILL (Chaim Sheba Medical Center; Tel Aviv University, Ramat Gan, Israel) Journal of Applied Physiology· Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, March 1983, p. 831-836 refs

Fourteen postheatstroke subjects and nine normal control subjects with similar O2 consumption were subjected to a 180 min heat tolerance test at an ambient temperature of 40 C. Nine subjects of the postheatstroke group thermoregulated in a way similar to that of the control group, and five were identified as heat-intolerant. Skin surface area-to-body mass ratios for the intolerant group were significantly lower than in the group of nine subjects, while the work efficiency of both groups was significantly lower than that of the controls The results suggest that a reduced work efficiency and/or a reduced areas-to-mass ratio play a role in heat intolerance, leading to increased heat production and concomitantly less effective heat dissipation. O.C

A83-30494
SEXUAL INFLUENCE ON THE CONTROL OF BREATHING
D. P WHITE, N. J DOUGLAS, C. K PICKETT, J. V WEIL, and C. W ZWILLICH (Colorado University, Health Sciences Center, Denver, CO) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, April 1983, p. 874-879. refs
(Contract NIH-HL-124985)

A systematic comparison is presented of resting ventilation and ventilatory responses to chemical stimuli in men and women. It is found that resting ventilation correlates closely with CO2 production in all subjects, but women tend to have a greater minute ventilation per milliliter of CO2 produced and consequently a lower CO2 partial pressure. It is also found that women have lower tidal volumes, even when corrected from body surface area, and greater respiratory frequency than comparable males. The hypoxic ventilatory response (HVR) quantitated by the shape parameter A is significantly greater in men than in women. This hypoxic response correlates closely with O2 consumption in men, but with no measure of size or metabolic rate in women. The hypercapnic ventilatory response, expressed as the slope of ventilation versus the CO2 partial pressure, is also greater in men than in women. In addition, women tend to have higher ventilatory responses in the luteal than in the follicular menstrual phase, but this is found to be significant only for HVR. It is concluded that women, with relatively higher resting ventilation, have lower responses to hypoxia and hypercapnia. N.B.

A83-30495
GRAVITY DEPENDENCE OF PHASES III, IV, AND V IN SINGLE-BREATH WASHOUT CURVES
M. VERHAMME, J. ROELANDTS, M. DE ROO, and M. DEMEDTS (Leuven, Katholieke Universiteit, Louvain, Belgium) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, April 1983, p. 887-895. refs

The gravity dependence of phases III (IIIa and IIIb), IV, and V of simultaneously performed He-bolus and N2-resident gas single-breath washout curves is studied in male subjects in different body positions using the technique of 180 degrees body inversion between inspiration and expiration. Results show that phase IIIa is mainly determined by nongravitational factors, while phase IIIb is influenced by gravitational as well as nongravitational factors. The gravitational factors are found to be more important with the bolus method in both lateral decubitus positions, while the nongravitational factors are more important with the N2 method in the prone and supine positions Phases IV and V are mainly gravity dependent. The difference in gravity dependence between the He and N2 methods is found to be correlated with the vertical interregional concentration gradients of both gases The greater gravity dependence in the lateral decubitus positions than in the supine or prone postures is shown to be related to the larger vertical interregional concentration difference as well as the more pronounced sequential ventilation in the lateral decubitus positions The various effects of gravity on these phases are determined to be in agreement with the increased sequential filling and emptying due to gravity near residual volume N.B

A83-30497
EFFECTS OF BETA-ADRENERGIC BLOCKADE ON O2 UPTAKE DURING SUBMAXIMAL AND MAXIMAL EXERCISE
P A TESCH (Karolinska Institutet, Stockholm, Sweden) and P. KAISER (Karolinska Sjukhuset, Stockholm, Sweden) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, April 1983, p. 901-905. Research supported by the Karolinska Institute's Research Funds and ICI-Pharma. refs

The changes in cardiorespiratory variables and the perceived rate of exertion (RPE) were investigated in 13 trained male subjects performing cycling exercise before and after beta-adrenergic blockage. Propranolol was administered orally 2 hr before the standardized maximal and submaximal exercises. Results show that during submaximal exercises O2 consumption decreased from 2.76 to 2 59 1/min following blockage, while heart rate decreased from 157 to 113 beats/min. Maximal O2 uptake declined from 3 79 to 3.26 1/min and maximal heart rate was reduced from 192 to 142 beats/min as a result of the blockage. 'Local' RPE was higher than 'central' RPE after beta-blockage in both submaximal and maximal exercise. The changes in both local and central RPE during submaximal exercise were shown to be positively correlated to changes in O2 uptake These results indicate that blockage of beta-adrenergic receptors reduces O2 consumption during submaximal and maximal exercise in habitually trained men N.B

A83-30498* Medical Coll. of Virginia, Richmond.
HUMAN SINUS ARRHYTHMIA AS AN INDEX OF VAGAL CARDIAC OUTFLOW
D. L. ECKBERG (U S. Veterans Administration, Medical Center; Virginia Medical College, Richmond, VA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, April 1983, p. 961-966. Research supported by the U.S. Veterans Administration. refs
(Contract NAG9-14; NIH-HL-22546, NIH-HL-22581; NIH-HL-22296)

The human central vagal mechanisms were investigated by measuring the intervals between heartbeats during controlled breathing (at breathing intervals of 2 5-10 s and nominal tidal volumes of 1000 and 1500 ml) in six young men and women. It was found that as the breathing interval increased, the longest heart periods became longer, the shortest heart periods became

shorter, and the peak-valley P-P intervals increased asymptotically. Peak-valley intervals also increased in proportion to tidal volume, although this influence was small. The phase angles between heart period changes and respiration were found to vary as linear functions of breathing interval. Heart period shortening began in inspiration at short breathing intervals and in expiration at long breathing intervals, while heart period lengthening began in early expiration at all breathing intervals studied It is concluded that a close relationship exists between variations of respiratory depth and interval and the quantity, periodicity, and timing of vagal cardiac outflow in conscious humans The results indicate that at usual breathing rates, phasic respiration-related changes of vagal motoneuron activity begin in expiration, progress slowly, and are incompletely expressed at fast breathing ratges N B.

A83-30499
SWEATING EFFICIENCY IN ACCLIMATED MEN AND WOMEN EXERCISING IN HUMID AND DRY HEAT
A. J. FRYE and E KAMON (Pennsylvania State University, University Park, PA) *Journal of Applied Physiology Respiratory*, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, April 1983, p. 972-977 refs

The thermoregulatory function and the density of active sweat glands were studied in equally fit men and women exposed to both humid and dry heat. Results show no differences between sexes or environments in rectal temperature or heart rate, while both sexes had significantly lower total body sweat rate (Msw) and chest sweat rate in the humid heat compared with the dry heat. The women maintained significantly lower Msw and chest sweat rate than in teh men in the humid heat, with significantly higher sweating efficiency, while there were no differences in sweating rates or efficiency between sexes in the dry heat Among the women, the sweat gland activity per unit surface area (rho-SGA) relative to the maximum rho-SGA (precent rho-SGAmax) and the sweating efficiency were significantly higher in the dry heat than in the humid heat, while the sweat gland flow (SGF) was similar in both environments. Among the men, SGF was found to be significantly higher in the dry heat than in the humid heat, while the percent rho-SGAmax and sweating efficiency were similar in both environments. These results show that the women were able to conserve body water through improved sweating efficiency, while the men had a larger apparent reserve to increse sweating in more severe dry heat. N B.

A83-30501* California Univ , San Diego.
FLUID SHIFTS AND MUSCLE FUNCTION IN HUMANS DURING ACUTE SIMULATED WEIGHTLESSNESS
A. R. HARGENS, C. M. TIPTON, P. D GOLLNICK, S. J. MUBARAK, B J TUCKER, and W. H. AKESON (U.S Veterans Administration, California, University, San Diego, CA; Iowa, University, Iowa City, IA; Washington State University, Pullman, WA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, April 1983, p. 1003-1009. Research supported by the U.S. Veterans Administration. refs
(Contract NAS9-16039)

The acute effects of simulated weightlessness on transcapillary fluid balance, tissue fluid shifts, muscle function, and triceps surface reflex time were studied in eight supine human subjects who were placed in a 5 degrees head-down tilt position for 8 hr. Results show a cephalic fluid shift from the legs as indicated by facial edema, nasal congestion, increased urine flow, decreased creatinine excretion, reduced calf girth, and decreased lower leg volume. The interstitial fluid pressure in the tibialis anterior muscle and subcutaneous tissue of the lower leg was found to fall significantly, while other transcapillary pressures (capillary and interstitial fluid colloid osmotic pressures) were relatively unchanged. The total water content of the soleus muscle was unchanged during the head-down tilt. After head-down tilt, isometric strength and isokinetic strength of the plantar flexors were unchanged, while the triceps surae reflex time associated with plantar flexion movement slowed slightly. These results demonstrate a dehydration effect of head-down tilt on muscle and subcutaneous tissue of the lower leg that may affect muscle function N.B.

A83-30502
EFFECT OF COLD EXPOSURE ON VARIOUS SITES OF CORE TEMPERATURE MEASUREMENTS
S. D. LIVINGSTONE, J GRAYSON, J FRIM, C L. ALLEN, and R. E. LIMMER (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada) Journal of Applied Physiology· Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, April 1983, p. 1025-1031. refs

Rectal, esophageal, auditory canal, gasdtrointestinal tract, and sublingual temperatures were obtained for five young male subjects who, in an environment of -32 C and 11 km/hr wind, sat during one 90 min exposure and walked on a treadmill at 2.9 km/hr during another. The clothing provided adequate protection for all parts of the body except the torso. Results show that in the control environment all of the internal body temperatures measured gave comparable and consistent values, while cold exposure affected the various sites differently Esophageal temperatures were found to fluctuate rapidly as a result of subjects swallowing cold saliva, and the sublingual temperatures were below the lower limit of a clinical thermometer, possibly because of facial cooling Auditory canal temperatures were low, perhaps also due to facial cooling. Rectal temperatures and the gastrointestinal tract temperatures were high, perhaps due to local heat production in response to cold stimulation. It was found that the metabolic rate increase initially in the cold and again toward the end of the cold exposure. N.B

A83-30503
ANAEROBIC THRESHOLD, BLOOD LACTATE, AND MUSCLE METABOLITES IN PROGRESSIVE EXERCISE
H. J. GREEN, R. L. HUGHSON, G. W. ORR, and D. A. RANNEY (Waterloo, University, Waterloo, Ontario, Canada) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, April 1983, p. 1032-1038. Research supported by the Natural Science and Engineering Research Council of Canada. refs

The purpose of the study is to examine systematically the assumptions presented by Wasserman et al (1973) using progressive exercise Particular attention is given to the interrelationship between the anaerobic threshold (AT) as detected by respiratory and blood La criteria and the alteration in muscle energy metabolism as evaluated by changes in selected glycolytic intermediates It is hypothesized that in progressive exercise, elevations in muscle anaerobic glycolysis occur before the detection of the AT by extramuscular techniques. The findings suggest that the increases in muscle and blood La during progressive exercise are not coincidental. Significant elevations in muscle La occur before the detection of a breakaway in blood La The use of gas exchange criteria, in particular the relationship between the ventilation and O2 uptake, for detecting the threshold of anaerobic glycolysis as indicated by increased La concentration in either muscle or blood, is not seen as warranted. C.R.

A83-30505
ESTIMATION OF HUMAN SUSCEPTIBILITY TO THE HIGH-PRESSURE NERVOUS SYNDROME
J C ROSTAIN, C. LEMAIRE, M C. GARDETTE-CHAUFFOUR, J. DOUCET, and R. NAQUET (CNRS, Groupement d'Interet Scientifique de Physiologie Hyperbare, Marseille; Direction Recherches, Etudes et Techniques, Service des Recherches, Paris; CNRS, Laboratoire de Physiologie Nerveuse, Gif-Sur-Yvette, Essonne, France) Journal of Applied Physiology· Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, April 1983, p. 1063-1070. Sponsorship: Direction Recherches, Etudes et Techniques. refs
(Contract DRET-79-131)

Twenty-four divers are subjected to a series of electroencephalographic (EEG) and psychometric tests at the surface and at 180 m after a rapid compression (15 min) in an attempt to determine their susceptibility to high-pressure nervous

syndrome (HPNS). For the psychometric tests, large individual variability is observed between the surface and 180 m. Although this makes it impossible to predict the behavior of a subject at 450 m, the classification established from absolute values is stable from the surface to 450 m. For the EEG activities, it is found that the size of EEG modifications at 450 m can be predicted at group level by a 180-m dive performed with fast compression in similar breathing mixtures. Even though the most important symptom or criterion for determining whether a particular diver should go down to depths greater than 300 m is yet to be defined, it is stressed that EEG modifications should not be neglected. C.R.

A83-30506
EFFECT OF EXERCISE ON QRS DURATION IN HEALTHY MEN - A COMPUTER ECG ANALYSIS
A. L. GOLDBERGER and V BHARGAVA (U.S. Veterans Administration, Medical Center, San Diego, CA) Journal of Applied Physiology: Respiratory, Environmental and Exercies Physiology (ISSN 0161-7567), vol. 54, April 1983, p. 1083-1088. Sponsorship: U.S. Veterans Administration. refs
(Contract USVA-MRIS-7824; NIH-HL-12373)

A digital electrocardiograph (ECG) cart sampling at 500 Hz is used to record a bipolar precordial lead (V5-V2) in 25 healthy men at rest and immediately after submaximal treadmill exercises The QRS duration is measured on complexes recorded at high gain and expanded time scale A signifícnat (P less than 0.0005) decrease in QRS duration is noted, and decreased QRS duration is observed in all 25 subjects In addition, significant shortening of the intervals between QRS onset and Q-wave nadir and between QRS onset and R-wave peak is observed. However, no significant differences are observed in the percentage shortening of early vs later phases of the QRS. It is concluded that decreased QRS duration is a physiological response to moderate treadmill exercise in healthy men, reflecting enhancement of conduction in the early, middle, and later phases of ventricular activation C.R

A83-30507
EFFECT OF CENTRAL VASCULAR ENGORGEMENT AND IMMERSION ON VARIOUS LUNG VOLUMES
M. J. BUONO (San Diego State University, San Diego, CA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, April 1983, p. 1094-1096 refs

The purpose of this study was to determine the relative contribution of central vascular engorgement (CVE) and increased hydrostatic pressure on various lung volumes during head-out immersion in water Residual volume (RV) and vital capacity (VC) were determined on 12 male volunteers under three randomly assigned conditions control, CVE, and immersion. CVE was produced via G-suit inflation There were significant (P less than 0 01) mean decreses, compared with the control value, of 4.9 percent (280 ml) and 5.9 percent (340 ml) in VC during CVE and immersion, respectively RV was not significantly changed across the three conditions. It was concluded that more than 80 percent of the decrease in VC during immersion can be attributed to CVE. However, the mechanism by which CVE decreased VC is still unclear. In addition, these data suggest that RV is relatively insensitive to the increase in CVE normally associated with immersion. Therefore, during immersion, RV is not simply the result of the balance of these opposing forces (i.e., CVE and hydrostatic pressure), as previously suggested. Author

A83-30509
EFFECTS OF LOW CONCENTRATIONS OF CHLORINE ON PULMONARY FUNCTION IN HUMANS
H. H. ROTMAN, M. J. FLIEGELMAN, T. MOORE, R. G. SMITH, D. M . ANGLEN, C. J. KOWALSKI, and J. G WEG (Michigan, University, Medical Center, Ann Arbor, MI) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, April 1983, p. 1120-1124. Research supported by the Chlorine Institute refs

Eight healthy unacclimated volunteers are exposed to chlorine gas in concentrations of 0.5 or 1 ppm, and several pulmonary function measurements are made. Comparisons are made by paired t test (Cotton, 1974) between the percent change from base-line values obtained at various times after chlorine exposure and the percent change from base line at analogous times after a sham exposure. With the sham vs 0.5-ppm exposure, trivial changes are observed. The total lung capacity is lower before the 0.5-ppm exposure than before the sham exposure, and the percent decrease in carbon dioxide pulmonary diffusing capacity is smaller 24 h after 0.5-ppm than 24 h after sham exposure With the sham vs. 1-ppm exposure, there are many differences in percent change from base line that are significant at the P less than 0.05 level or better. It is concluded that even though chlorine at low concentrations does not produce any serious subjective symptoms, it adversely affects pulmonary function transiently C R

A83-30928
CARDIOVASCULAR ADAPTATION TO WEIGHTLESSNESS
C. G. BLOMQVIST (Texas, University, Health Science Center, Dallas, TX) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 7 p. refs
(SAE PAPER 820830)

Exposure to actual and simulated zero gravity causes a significant central or cephalad shift of intravascular and interstitial fluid which triggers a complex set of cardiovascular and systemic adaptations. These adaptations are, in turn, directly responsible for the cardiovascular dysfunction that is apparent after return to normal gravity However, critical information on several important adaptive mechanisms is incomplete or lacking An attempt will be made to resolve these problems during a future dedicated life sciences Space Shuttle Flight. A series of cardiovascular experiments will utilize direct measurements of central venous pressures, cross-sectional echocardiography, and non-invasive measurements of systemic and peripheral blood flow at rest and during stress. Autonomic control mechanisms will be studied in detail. s

A83-30929* National Aeronautics and Space Administration Lyndon B. Johnson Space Center, Houston, Tex.
METABOLIC EXPERIMENTS ON SPACELAB-4
C. S. LEACH (NASA, Johnson Space center, Biomedical Laboratories Branch, Houston, TX) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 5 p refs
(SAE PAPER 820831)

Studies of human metabolism are being considered in five experiments. These investigations address physiological effects of zero gravity which have become evident in previous manned space flights, namely, negative Na, Ca and N balances, the resorption of bone, loss of red cell mass, cephalad migration of body fluids, and a shift in water balance. Although these effects have been fairly well established by pre- and postflight measurements, details of the mechanism by which they occur remain largely unknown. Moreover, the data collected inflight, particularly during the first few hours of weightlessness, have been severely limited both in the amount of quantitative information obtained and with respect to the relative simplicity of the experimental techniques employed. During the Spacelab 4 mission, the acute stage of the response to zero gravity will be the main focus of attention of several experiments. Measurements conducted later in the mission will center on the adaptive phase of metabolic responses. Author

A83-30931* Massachusetts Inst. of Tech , Cambridge.
SPACE MOTION SICKNESS AND VESTIBULAR EXPERIMENTS IN SPACELAB
C. M. OMAN (MIT, Cambridge, MA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 22 p. refs
(Contract NAS9-16523; NCC9-1)
(SAE PAPER 820833)

Approximately 43 percent of Apollo, Skylab, Soyuz/Salyut and Shuttle crewmen have experienced symptoms resembling motion sickness during their first several days in space. This paper reviews

the space sickness problem in both an operational and physiological context, and describes experiments planned by a team of vestibular researchers from the USA and Canada to study space sickness and associated sensory-motor adaptation to weightlessness during Spacelab missions 1 and 4, and the German Spacelab mission D-1. Author

A83-30949
AN INVESTIGATION OF THE MICROCIRCULATORY BED IN FLIGHTCREW MEMBERS WITH CONJUNCTIVITIS DURING THE INITIAL APPEARANCE OF CEREBRAL ATHEROSCLEROSIS [ISSLEDOVANIE MIKROTSIRKULIATORNOGO RUSLA KON'IUNKTIVY U LITS LETNOGO SOSTAVA S NACHAL'NYMI IAVLENIIAMI TSEREBRAL'NOGO ATEROSKLEROZA]
B. I PARMENOV-TRIFILOV, T. I. MILIAVSKAIA, N. G DAVYDOVA, A. IA BRAGINA, S. G. SVININNIKOV, and B KH. SEMENOV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), March 1983, p 44-46. In Russian refs

A83-30950
THE CHANGES IN THE T AND B IMMUNE SYSTEMS IN SAILORS DURING PROLONGED VOYAGES [IZMENENIIA T- I V-SISTEM IMMUNITETA U MORIAKOV V DLITEL'NOM PLAVANII]
V. S. NOVIKOV, A. A POVAZHENKO, and V I LOGINOV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), March 1983, p 46, 47. In Russian

The activity of immune reactions is studied in sailors during extended sea voyages and the physiological significance of these reactions is examined during the adaptation of the sailors to different environmental conditions. The changes in the content of the T, B, and O lymphocytes were determined in 45 sailors (18-21 years of age) at various times before, during, and after an extended sea voyage Results show that major changes in the functioning of the immune systems occur during the voyages The content of T lymphocytes in the blood increased after one month at sea which indicates a higher stress on the T immune system during the adaptation to the conditions of sailing. The content of T and B lymphocytes decreased after one month of sailing which indicates a weakening of the functioning of the T and B immune systems. It is concluded that these changes are evidence of the weakening of the antiinfection stability of the subjects and indicate the possibility of increases in autoimmune diseases N.B.

A83-31395
PHYSIOLOGICAL ASSESSMENT OF RIGHT-SIDE AND LEFT-SIDE CARDIOHEMODYNAMICS IN PATIENTS WITH HYPERTENSION [FIZIOLOGICHESKAIA OTSENKA PRAVO-LEVOSTORONNEI KARDIO-GEODINAMIKI U BOL'NYKH GIPERTONICHESKOI BOLEZN'IU]
V S. SHAGINIAN (Detskii Vrachebno-Fizikul'turnyi Dispanser, USSR) Akademiia Nauk Gruzinskoi SSR, Soobshcheniia (ISSN 0132-1447), vol. 108, Dec. 1982, p 645-648 In Russian. refs

A83-32451
PROBLEMS IN AEROSPACE MEDICINE POSED BY MITRAL VALVE PROLAPSE [PROBLEMES POSES EN MEDECINE AERONAUTIQUE PAR LE PROLAPSUS DE LA VALVE MITRALE]
M KOMAJDA, Y GROSGOGEAT (Centre Hospitalier Universitaire Pitie-Salpetriere, Paris, France), and P LEDOUX (Air-Inter - Ligne Aeriennes Interieures, Service Medical, Paray-Vielle-Poste, Essonne, France) Medecine Aeronautique et Spatiale, vol 22, 1st Quarter, 1983, p. 9-13 In French. refs

A review is presented of several aspects of mitral valve prolapse which are of importance in aerospace medicine. Aspects examined include the anatomy and etiology of mitral valve prolapse, the physiopathology of this condition, clinical identifications, the echocardiogram and hemodynamics of patients with this condition, and the frequency and evaluation of mitral valve prolapse, as well as its treatment. It is concluded that despite its apparent frequency, mitral valve prolapse is benign in most cases and presents minimal concern for aerospace medicine. Several noninvasive techniques, such as echocardiography, are available for precisely determining the seriousness of mitral valve prolapse in flight personnel. N B

A83-32452
THE CHEMOPROPHYLAXIS OF MALARIA IN FLIGHT PERSONNEL [LA CHIMIOPROPHYLAXIE DU PALUDISME DANS LE PERSONNEL NAVIGANT DE L'AERONAUTIQUE]
S LANDAIS (Centre Principal d'Expertise Medical du Personnel Navigant, Paris, France), P. FOURN (Union de Transports Aeriens; Air Afrique, Service Medical, Puteaux, Hauts-de-Seine, France), H. PICARD, H ILLE (Hopitaux des Armees, Paris, France), R. CARRE, and A DIDIER Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p 14-18 In French. refs

A83-32453
THE PATHOLOGY OF CRISIS AND MEDICAL TRANSPORT OF MENTAL PATIENTS IN ACUTE CONDITIONS [PATHOLOGIE DE CRISE ET TRANSPORT MEDICALISEDES MALADES MENTAUX EN PHASE AIGUEE]
B VEREBELY, J. P WEIL, and J P DELMAS (Mondial Assistance, Paris, France) Medecine Aeronautique et Spatiale, vol 22, 1st Quarter, 1983, p. 19-25. In French. refs

A83-32454
CURRENT BAROTRAUMATIC OTITIS OF THE COMMERCIAL FLIGHT PERSONNEL IN CIVIL AVIATION [ACTUALITEDES OTITES BARO-TRAUMATIQUES CHEZ LE PERSONNEL NAVIGANT COMMERCIAL DE L'AERONAUTIQUE CIVILE]
P. LEDOUX, M. PITTACO (Air Inter - ligne Aeriennes Interieures, Service Medical, Paray-Vielle-Poste, Essonne, France), and P NARCY (Hopital Bretonneau, Paris, France) Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p. 25-29. In French. refs

The diagnosis and etiology of barotraumatic otitis is examined for the flight personnel of a French domestic airline which has many brief flights. The etiology of 412 cases of barotraumatic otitis among the flight personnel of this airline is investigated Attention is focused on the technological causes of barotraumatic otitis such as the pattern of appearance of this condition, the altitudes of the flights, the pressurization of the cabins, and the flight patterns; and on the individual characteristics of this condition in the flight personnel. Several suggestions for decreasing the incidence of barotraumatic otitis are presented including the practice of the Valsalva maneuver N.B.

A83-32455
THE STRESS ECG AND THE AMBULATORY CONTINUOUS ECG IN THE SELECTION OF FRENCH ASTRONAUTS [L'ELECTROCARDIOGRAMME D'EFFORT ET L'ELECTROCARDIOGRAMME CONTINU AMBULATOIRE DANS LA SELECTION DES SPATIONAUTES FRANCAIS]
G. LEGUAY, A. SEIGNEURIC, and G. JACOB (Hopital d'Instruction des Armees Dominique Larrey, Versailles, France) Medecine Aeronqutique et Spatiale, vol. 22, 1st Quarter, 1983, p. 30-32. In French.

ECG monitoring is carried out in stress and continuous modes during the selection of French astronauts. The stress trials involve 20 W power increases every 2 min ergometer pedaling in order to elicit a maximal heart rate. The continuous mode comprises traces from sensors attached to the candidate for 24 hr while normal duties are performed. The ECG data are used to determine the changes in heart rate, to identify dysfunctions related to supraventricular or ventricular excitability, and to identify repolarization maladies The stress ECGs have revealed auricular extra-systole with quadrigeminism, a precipitous decline in arterial strain accompanied by lipothymia at the end of the stress, a T wave anomaly evoking hyperventilation, and a short episode of brachycardia. The 24-hr traces disclosed sporadic auricular extrasystole, a sinusial dysfunction with brachyarhythmia, a nocturnal Wenckebach auriculoventricular conduction problem, and a sinusial dysfunction with severe brachycardia. The degree to which each symptom weighs on the decision to grant spaceflight clearance is discussed, particularly for assessing fitness for

Spacelab missions The three levels of physical condition that must be satisfied are anatomically healthy cardiovascular structures, an anatomic prognosis of continued health in the mid-term, and a satisfactory prognosis for spaceflight adaptation.
N B

A83-32456
ORTHOSTATIC AND ANTIORTHOSTATIC TESTS FOR FRENCH ASTRONAUTS DURING TRAINING [TESTS D'ORTHOSTATISME ET D'ANTI-ORTHOSTATISME CHEZ LES SPATIONAUTES FRANCAIS EN COURS D'ENTRAINEMENT]
J. COLIN, J. TIMBAL (Centres d'Etudes et de Recherches de Medecine Aerospatiale, Paris, France), and A GUELL (Centre Hospitalier Universitaire Ranqueil, Toulouse, France) Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p 33-37. In French refs

The use of orthostatic and antiorthostatic tests as methods to determine the adaptation of astronauts to conditions of microgravity is evaluated. The results of these tests are compared for the cases of French astronaut candidates who had undergone training for space flight conditions and individuals with no particular physical training. It is found that measurements of the systolic time intervals during orthostatic and antiorthostatic tests by electrical plethysmography can be used to follow the cardiovascular reactions to changes of body position during exposure to microgravity These tests were utilized to detect individuals with poor orthostatic tolerance and were also used to determine the circadian rhythm of the systolic time intervals N B

A83-32460
DEGRADATION OF PSYCHOMOTOR PERFORMANCE UNDER 16-18 HZ SINUSOIDAL VIBRATION [DEGRADATION DE LA PERFORMANCE PSYCHOMOTRICE SOUS VIBRATION SINUSOIDALE DE 16 A18 HZ]
J. M. CLERE and J L. POIRIER (Centre d'Essais en Vol, Bretigny-sur-Orge, Essonne, France) Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p. 50-52 In French.

Trials were run to quantify the degradation in psychomotor performance induced by the low frequency, 16-18 Hz 0 1-0.3 g accelerations experienced by helicopter flight crews. Ten subjects participated in visual tracking experiments (the primary task), and in a secondary task involving extinguishing colored lights. The subjects were seated on a helicopter seat fastened to a vibrating table. The tasks lasted 90 min each, with 0 1, 0 2, and 0 3 g accelerations at different intervals of the tests A control run with no vibrations was also performed. The trials also covered movements on either the horizontal or vertical axis. Response time and accuracy were used as the variables. The primary task was accomplished at constant level with or without vibration while the secondary task degraded in the presence of vibration. Further trials are indicated to study hand displacements under vibration, as well as the effects of fatigue, noise, and thermal conditions.
M S.K.

A83-32461
MEDICAL PROBLEMS PECULIAR TO AIRLINE PILOTS [PROBLEMES MEDICAUX PARTICULIERS AU PERSONNEL NAVIGANT DE L'AVIATION DE LIGNE]
J. LAVERNHE (Compagnie Nationale Air France, Paris, France) Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p 63-66. In French.

The flight altitude and speed distinguish the flying conditions experienced by airline pilots. Cabin pressure is automatically regulated to a maximum simulated pressure of 2500 m altitude for 40,000 ft altitude cruise conditions. Tobacco smokers experience diminished oxygenation of the hemoglobin and thus effectively fly at higher altitudes than nonsmokers Frequent ascents and descents and the concomitant pressure changes, especially if the transitions are rapid, can cause barotraumatic conditions in the ear, with possible rupture of the tympanic membrane; Valsalva's maneuver can ward off the barotraumatisms. Another problem is the low humidity in airliner cabin air, producing dehydration in the respiratory mucous membranes and the possible side-effect of calculus formation in the urinary tract. Disturbances in circadian rhythms due to long distance flying in E-W or W-E directions can cause digestive disturbances and/or effective insomnia, requiring 3-4 days for recovery. Stays in tropical countries expose pilots to tropical diseases and parasites, most being amenable to medication. The health profiles of pilots, as well as their technical skills, need regular updating to assure flight safety.
M S K.

A83-32462
MAXILLARY INTRASINUS BENIGN EXPANSIVE PROCESSES THAT INFLATE AND/OR DESTROY THE SINUS BONEY WALLS (FIVE CASE STUDIES) INTEREST IN THEIR KNOWLEDGE FOR AERONAUTICAL MEDICINE [LES PROCESSUS EXPANSIFS BENINS INTRASINUSIENS MAXILLAIRES QUI SOUFFLENT ET/OU DETRUISENT LES PAROIS OSSEUSES SINUSIENNES APROPOS DE CINQ OBSERVATIONS - INTERET DE LEUR CONNAISSANCE EN MEDECINE AERONAUTIQUE]
J. FLAGEAT, P BUFFE, A. PASTUREL, P J. METGES (Hopital d'Instruction des Armees Begin, Saint-Mande, Val-de-Marne, France), H. RIVIERE-CAZAUX, MR RIGAUD (Hopital d'Instruction des Armees Val-de-Grace, Paris, France), and H. LIENHART (Centre Principal d'Expertise Medical du Personnel Navigant, Paris, France) Medecine Aeronautique et Spatiale, vol 22, 1st Quarter, 1983, p. 67-73. In French. refs

A83-32463
AVIATION MEDICINE TRAINING FOR AIRCREW IN THE 1980'S
M. G VENN (RAF, Aviation Medicine Training Center, Oakham, Leics , England) (International Academy of Aviation and Space Medicine and SocieteFrancaise de Physiologie et de Medecine Aeronautiques et Cosmonautiques, Congres International du Medecine Aeronautique et Spatiale, 29th, Nancy, France, Sept. 7-11, 1981) Medecine Aeronautique et Spatiale, vol 22, 1st Quarter, 1983, p 89-93. refs

Aviation medicine courses taken by RAF aircrew personnel are outlined, noting the continuous education throughout a crewmember's career. The courses are given to improve flight safety and individual effectiveness. Beginning courses include the physiological effects of flight, and progress in flight school and the number of hours of flight time are accompanied with education in the physiological effects to be expected in the particular aircraft to which the student will be assigned. Refresher courses are taken on a two or three day basis in succeeding years at designated centers The short nature of the courses has proved to be effective in ensuring flight crew cooperation and thoroughness of learning Instruction is given in altitude physiology, orientation/disorientation, acceleration, thermal stress, sensory organ performance, psychology, first aid, and aircrew health in an effort to safely allow flightcrew members to be their own judge of their capability to fulfill daily flight duties. M.S.K.

A83-32466
THE SIGNIFICANCE OF SEVERAL PHYSIOLOGICAL PARAMETERS DURING THE ASSESSMENT OF THE FLIGHT FITNESS OF STUDENT PILOTS [VALEUR DE QUELQUES PARAMETRES PHYSIOLOGIQUES LORS DE L'APPRECIATION DE L'APTITUDE ALACHER DES PILOTES-STAGIAIRES]
R. DEBIJADJI, N. RANKOVIC, L. PEROVIC, and M. JANJUSEVIC (Service de Santede l'Armee de l'Air, Zemun, Yugoslavia) (International Academy of Aviation and Space Medicine and SocieteFrancaise de Physiologie et de Medecine Aeronautiques et Cosmonautiques, Congres International du Medecine Aeronautique et Spatiale, 29th, Nancy, France, Sept. 7-11, 1981) Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p. 101-103. In French refs

The results of monitoring of the heart rate, ECG, catecholamines excretion, and the oxygen consumption by the heart muscles of student pilots on their first solo flight around the airport control tower are reported. The students who did not obtain ATC permission to deviate from the circular path were found to have heart rates of up to 168/min, compared with a value of 138/min

for the students who were given permission. The quantities of adrenaline and noradrenaline, as well as the oxygen consumption by the heart, were also elevated compared to the released pilots The data seem to indicate that the physiological parameters recorded can be implemented as supplementary bases for determining the flight-readiness of student pilots. M S.K.

A83-32684
ACUTE MOUNTAIN SICKNESS, ANTACIDS, AND VENTILATION DURING RAPID, ACTIVE ASCENT OF MOUNT RAINIER
R. C. ROACH (Cornell University, Ithaca, NY), E. B. LARSON, T F HORNBEIN (Washington, University, Seattle, WA), S BARTLETT, J. HARDESTY, D. JOHNSON, M. PERKINS (Evergreen State College, Olympia, WA), and C. S. HOUSTON Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, May 1983, p. 397-401. refs
(Contract NSF SOS-5372)

A double-blind randomized study of 45 climbers on Mt Rainier was conducted to test the effectiveness of antacids in preventing acute mountain sickness. All 45 climbed to 3353 m, and 31 continued to the summit. Ten climbers listed acute mountain sickness as the reason for not attaining the summit. Of symptoms monitored throughout the climb, neither headache, nausea, dizziness, pounding heart, nor shortness of breath differed in severity between antacid-treated and placebo-treated groups. In both groups vital capacity decreased significantly with ascent (p less than 0 05), while peak flow (p less than 0 005) and minute ventilation (p less than 0 001) increased significantly The seven climbers with the most severe AMS symptom scores above 4000 m had significantly lower peak flow at sea level prior to ascent compared with the other 25 climbers who completed sea level tests (p less than 0.005) The results of this study fail to document efficacy for antacid use for the prevention of acute mountain sickness. Author

A83-32685* Miami Univ., Oxford, Ohio
PHYSIOLOGICAL AND BEHAVIORAL EFFECTS OF TILT-INDUCED BODY FLUID SHIFTS
D E. PARKER, O. TJERNSTROM, A. IVARSSON, W L. GULLEDGE, and R. L POSTON (Miami University, Oxford, OH, Lunds Universitet, Malmo, Sweden) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, May 1983, p. 402-409. Research supported by the Miami University. refs
(Contract NAS9-14538)

This paper addresses the 'fluid shift theory' of space motion sickness. The primary purpose of the research was the development of procedures to assess individual differences in response to rostral body fluid shifts on earth Experiment I examined inner ear fluid pressure changes during head-down tilt in intact human beings Tilt produced reliable changes Differences among subjects and between ears within the same subject were observed. Experiment II examined auditory threshold changes during tilt. Tilt elicited increased auditory thresholds, suggesting that sensory depression may result from increased inner ear fluid pressure. Additional observations on rotation magnitude estimation during head-down tilt, which indicate that rostral fluid shifts may depress semicircular canal activity, are briefly described. The results of this research suggest that the inner ear pressure and auditory threshold shift procedures could be used to assess individual differences among astronauts prior to space flight. Results from the terrestrial observations could be related to reported incidence/severity of motion sickness in space and used to evaluate the fluid shift theory of space motion sickness. Author

A83-32689
A REVIEW OF THE LITERATURE CONCERNING RESUSCITATION FROM HYPOTHERMIA. I - THE PROBLEM AND GENERAL APPROACHES
R. M. HARNETT, J. R PRUITT, and F R. SIAS (Clemson University, Clemson, SC) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, May 1983, p. 425-434. Sponsorship. U S. Department of Transportation. refs
(Contract DOT-CG-72074-A)

A83-32695
SENSORY CONFLICT THEORY OF SPACE MOTION SICKNESS - AN ANATOMICAL LOCATION FOR THE NEUROCONFLICT
R. L. KOHL (Technology, Inc , Houston, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, May 1983, p. 464, 465.

Most investigators understand sensory conflict to mean a discontinuity between either visual, proprioceptive, and somatosensory input, or semicircular canal and otolith input. Few hypotheses have attempted to define specific physiological mechanisms linking the conflict with the sickness Suggestions that the theory be renamed the neural mismatch theory allow for the possibility that central integrative mechanisms are involved in interpreting the significance of the sensory environment and that the conflict between visual or vestibular input systems or between separate components of the vestibular system is of secondary importance to mismatch occurring between ongoing sensory experience and long-term memory. This paper describes the role of the limbic system in integration of sensory information and long-term memory, in the expression of the symptoms of motion sickness, and the impact of anti-motion sickness drugs and stress hormones on limbic system function. The limbic system may be the neural mismatch center of the brain. Author

A83-32800
VERTICAL FUSIONAL RESPONSE TO ASYMMETRIC DISPARITIES
A. E KERTESZ and A. L. PERLMUTTER (Northwestern University, Evanston, IL) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-30, April 1983, p 246-250. refs
(Contract NIH-EY-1055)

Objective measurement of the human vertical fusional response to asymmetric disparity presentation was carried out. Ramp disparities evoked mostly monocular eye movements Step disparities evoked binocular eye movements which began with conjugate saccades followed by slower vergence movements. The two saccade amplitudes were approximately equal, and each was greater than half of the disparity. Motor compensation was mostly incomplete, allowing for the existence of a significant sensory component. Slower time course characterized the vertical vergence movements which were otherwise similar to the horizontal motor response to asymmetric disparity presentation. Author

A83-32811
BAROMETRIC PRESSURES AT EXTREME ALTITUDES ON MT. EVEREST PHYSIOLOGICAL SIGNIFICANCE
J. B. WEST, S. LAHIRI, K. H. MARET, R. M. PETERS, JR., and C J. PIZZO (California, University, La Jolla, CA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, May 1983, p. 1188-1194. Research supported by the American Alpine Club, American Lung Association, National Geographic Society, Servier Laboratory (Paris), The Explorers Club, U.S. Army, and NSF. refs
(Contract NIH-R01-HL-24335; NIH-N01-HR-62915)

The physiological significance of barometric pressures at altitudes greater than 8,000 m are investigated using data collected during the American Medical Research Expedition to Mt. Everest. Barometric pressures were measured on Mt. Everest from altitudes of 5,400 (base camp) to 8,848 m (summit) Results show that the mean daily pressures were 400.4 + or 2.7 Torr at 5,400 m, 351 0 + or - 1 0 Torr at 6,300 m, 283 6 + or - 1.5 Torr at 8,050, and 253.0 Torr at 8,848 m These pressures are all significantly higher than those predicted from the ICAO Standard Atmosphere, mainly due to the fact that pressures at altitudes between 2 and 16 km are latitude dependent, being higher near the equator because of the large mass of cold air in the stratosphere of that region. Data from weather balloons is used to show that the pressure at the altitude of the summit of Mt. Everest varies considerably with season, being about 11.5 Torr higher in midsummer than in midwinter. It is concluded that the very low O2 partial pressure at the summit of Mt. Everest indicates that it is at the limit of man's tolerance, and even day-by-day variations in barometric pressure apparently affect maximal O2 uptake. N.B.

A83-32812
FORCE AND DURATION OF MUSCLE TWITCH CONTRACTIONS IN HUMANS AT PRESSURES UP TO 70 BAR
D. J. HARRIS (Duke University, Medical Center, Durham, NC) and P. B. BENNETT (AMTE Physiological Laboratory, Gosport, Hants., England) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, May 1983, p. 1209-1215. Research supported by the Ministry of Defence (Procurement Executive). refs
(Contract NIH-HL-07896)

A83-32815
EFFECT OF CAFFEINE ON SKELETAL MUSCLE FUNCTION BEFORE AND AFTER FATIGUE
J. M LOPES, M. AUBIER, J. JARDIM, J. V. ARANDA, and P. T. MACKLEM (McGill University, Montreal, Canada) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, May 1983, p. 1303-1305 refs

The effect of caffeine on voluntary and electrically stimulated contractions of the adductor pollicis muscle were studied in five adult volunteers. Electrical stimulation of the ulnar nerve was conducted at 10, 20, 30, 50, and 100 Hz before and after a sustained voluntary contraction held at 50 percent of the maximal voluntary contraction (MVC), while a brief tetanus at 30 Hz was performed to calculate the relaxation rate in the fresh muscle. The response of the fatigued muscle to different frequencies of stimulation after caffeine and placebo were assessed, as well as the contractile properties, relaxation rate, and endurance. Results show that there was no difference in the maximal tension obtained with electrical stimulation or in the MVC between placebo and caffeine. The tensions developed with electrical stimulation at lower frequencies were found to increase significantly with caffeine ingestion, shifting the frequency-force curve to the left, both before and after fatigue. The mean plasma caffeine concentration associated with these responses was determined to be 12.2 + or - 4 9 mg/1. It is concluded that caffeine has a direct effect on skeletal muscle contractile properties before and after fatigue as demonstrated by electrical stimulation. N B.

A83-32816
EFFECTS OF BETA-ADRENERGIC BLOCKADE ON VENTILATION AND GAS EXCHANGE DURING EXERCISE IN HUMANS
E. S. PETERSEN, B. J. WHIPP, J. A. DAVIS, D. J HUNTSMAN, H. V. BROWN, and K WASSERMAN (California, University, Medical Center, Torrance, CA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, May 1983, p. 1306-1313. Research supported by the John Perkins Memorial Fund and Wellcome Trust. refs
(Contract NIH-HL-11907)

The effects of beta-adrenergic blockade induced by intravenous propanolol hydrochlonde (0.2 mg/kg) on ventilatory and gas exchange responses to exercise were investigated in six healthy young male subjects during tests in which the work rate was either increased progressively or maintained at a constant load. The heart rate during exercise was found to decrease by about 20 percent, while the cardiac output decreased by about 15 percent. The relation between work rate and O2 uptake (VO2) was found to be unaffected by propranolol, while maximal O2 uptake decreased by 5 percent, and the anaerobic threshold was lowered by 23 percent. In addition, the relations between CO2 output (VCO2) and end-tidal CO2 partial pressure and between VCO2 and minute ventilation (VE) were shown to be unaffected. The time constants for changes of VO2, VCO2, and VE during on-transients from unloaded pedaling to either a moderate or a heavy work rate in the control studies were found to be in agreement with previously reported values. Beta-blockade was determined to be associated with a significantly increased time constant for VO2 of 61 s, but with less consistent and insignificant changes for VCO2 and VE. These results indicate that propranolol exerts its primary influence during exercise on the cardiovascular system without any discernible effect of ventilatory control. N.B.

A83-32817* Texas Univ. Health Science Center, Dallas.
CARDIOVASCULAR RESPONSES TO EXERCISE AS FUNCTIONS OF ABSOLUTE AND RELATIVE WORK LOAD
S. F. LEWIS, W. F. TAYLOR, R. M. GRAHAM, W A. PETTINGER, J. E. SCHUTTE, and C. G BLOMQVIST (Texas, University, Health Science Center, Dallas, TX) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, May 1983, p. 1314-1323. refs
(Contract NIH-HL-17669-08; NIH-HL-06296; NSG-9026)

The roles of absolute and relative oxygen uptake (VO2 and percent of muscle group specific VO2-max) as determinants of the cardiovascular and ventilatory responses to exercise over a wide range of active muscle mass are investigated. Experiments were conducted using four types of dynamic exercise: one-arm curl, one-arm cranking, and one and two-leg cycling at four different relative work loads (25, 50, 75, and 100 percent of VO2-max) for the corresponding muscle group Results show that VO2 during maximal one-arm curl, one-arm cranking, and one-leg cycling averaged 20, 50, and 75 percent, respectively, of that for maximal two-leg cycling. Cardiac output was determined to be linearly related to VO2 with a similar slope and intercept for each type of exercise, and the heart rate at a given percent VO2-max was higher with larger active muscle mass. It is concluded that the cardiovascular responses to exercise was determined to a large extent by the active muscle mass and the absolute oxygen uptake, with the principal feature appearing to be the tight linkage between systematic oxygen transport and utilization. N.B.

A83-32818
PULMONARY EFFECTS OF OZONE EXPOSURE DURING EXERCISE: DOSE-RESPONSE CHARACTERISTICS
W F MCDONNELL, D H. HORSTMAN, M. J HAZUCHA, E SEAL, JR., E D. HAAK, S. A SALAAM, and D. E. HOUSE (U.S. Environmental Protection Agency, Research Triangle Park; North Carolina, University, Chapel Hill, NC) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, May 1983, p. 1345-1352 refs

A83-32821
CARDIORESPIRATORY RESPONSES TO EXERCISE DISTRIBUTED BETWEEN THE UPPER AND LOWER BODY
M. M TONER, M. N SAWKA, L LEVINE, and K. B. PANDOLF (U.S. Army, Army Research Institute of Environmental Medicine, Natick, MA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 54, May 1983, p. 1403-1407. refs

The influence of distributing exercise between upper (arm crank exercise) and lower (cycle exercise) body muscle groups on cardiorespiratory responses to constant power output (PO) exercise is investigated. Experiments were conducted using six male volunteers who completed five submaximal exercise bouts of 7 min duration at both 76 and 109 W It is found that at a moderate PO, the relationship of the O2 uptake (VO2) and arm PO/total PO (percent arm) values appears linear, whereas at high PO the relationship is curvilinear. It is suggested that this increase in VO2 responses with increased percent arm values probably results from a requirement for body stabilization during combined arm-crank (AC) and leg cycling (LC) exercises at the moderate PO and from excessive body movements during only AC at high PO The heart rate difference between AC and LC and combined AC and LC seem to be related to a less facilitated venous return and an elevated afterload which would increase sympathetic output. N.B.

A83-32952
THE EFFECT OF EXTERNAL ENVIRONMENTAL FACTORS ON THE RHYTHM OF PHYSIOLOGICAL FUNCTIONS OF PRE-SCHOOL-AGE CHILDREN [VLIIANIE FAKTOROV VNESHNEI SREDY NA RITMY FIZIOLOGICHESKIKH FUNKTSII DOSHKOL'NIKOV]
P. V VASILIK, A. K. GALITSKII, A. A POPOV, N. V. CHERNEGA, L. M. GELESKUL, S A. BABKO, and G. A NAVROTSKAIA (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) Kibernetika i Vychislitel'naia Tekhnika (ISSN 0454-9910), no. 55, 1982, p 12-18 In Russian refs

The effect of various factors of the external environment on the rhythm of several physiological functions is investigated over a period of 4 months for 14 children (7 males and 7 females) between the ages of 6.0-6.5 years. Daily measurements included the body weight, breathing rate, pulse rate, the maximum and minimum arterial pressure, and urine content. It is found that the rhythms of the physiological functions were in periodic patterns whose period could be described by a harmonic function These patterns exhibited a structure similar to that of the rhythms of the external environment (e.g., solar activity). However, the rhythm of the factors of the external environment determined one of the rhythms of physiological function It is concluded that the rhythm of the factors of the external environment exert a controlling influence on the hierarchical rhythms of physiological function and coincide with only one of the terms of the hierarchy N.B.

A83-32959
AN INVESTIGATION OF THE HEMODYNAMICS OF A HUMAN IN AN ANTIORTHOSTATIC POSITION USING A METHOD OF MATHEMATICAL MODELING [ISSLEDOVANIE GEMODINAMIKI CHELOVEKA V ANTIORTOSTATIKE METODOM MATEMATICHESKOGO MODELIROVANIIA]
R D GRIGORIAN, B. L. PALETS, and S. A. PATSKINA (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) Kibernetika i Vychislitel'naia Tekhnika (ISSN 0454-9910), no. 55, 1982, p 98-101 In Russian. refs

A mathematical model of the hemodynamics of humans during orthostatic effects is developed in order to investigate the self-regulatory processes of the cardiovascular system in antiorthostatic positions, and the relative roles of the cardiac and vascular components of the systemic reaction of the hemodynamics during a clino-antiorthostatic rotation. A model of the noncontrolled cardiovascular system is employed in which the chain of baroreceptor feedback loops is broken and the system functions only according to the principle of self-regulation. The relative roles of the cardiac and vascular components are studied using a model of the baroreflector regulation of the arterial pressure during orthostatic effects It is concluded that the results of this study allow a deeper analysis of the processes of the regulation of the hemodynamics during orthostatic effects, which can be useful for investigations of the causes of blood circulation disorders during the clinical use of orthostatic tests N.B.

A83-32960
THE POSSIBILITIES OF THE INVESTIGATION OF NONLINEAR CONNECTIONS USING DIGITAL SIMULATION [VOZMOZHNOSTI ISSLEDOVANIIA NELINEINYKH SVIAZEI S POMOSHCH'IU MODELIROVANIIA NA ETSVM]
R E. LIUBITSKII, N. I. MOISEEVA, N. I. KARAULOVA, and V. M. DORONICHEVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kibernetika i Vychislitel'naia Tekhnika (ISSN 0454-9910), no. 55, 1982, p. 102-105. In Russian.

The possibilities of investigating nonlinear connections using digital simulation are examined using the example of studying the dependence of physiological parameters on geophysical factors and the incidence of solar flares Results show that slow variations of the constant magnetic field of the earth and magnetic disturbances have an effect on all the physiological factors studied (including body temperature, arterial pressure, and pulse rate) and evoke changes in the initial background in one or the other direction depending on the parameters of the field and/or the condition of the physiological system In addition, it is found that solar flares have an effect on all the physiological parameters studied, but this dependence is more pronounced than for the geophysical factors. It is concluded that it is possible to determine the nonlinear dependence of human physiological parameters on heliogeophysical factors by using computer simulation N.B.

A83-33110
SOME IMPROVEMENTS IN THE MEASUREMENT OF VARIABLE LATENCY ACOUSTICALLY EVOKED POTENTIALS IN HUMAN EEG
G. H STEEGER (Siemens AG, Erlangen, West Germany), O. HERRMANN (Twente, Technische Hogeschool, Enschede, Netherlands), and M. SPRENG (Erlangen-Nuernberg, Universitaet, Erlangen, West Germany) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol BME-30, May 1983, p. 295-303 Research supported by the Deutsche Forschungsgemeinschaft refs
(Contract DFG-HE-901; DFG-SCHU-195)

A83-33301
THE ADAPTATION OF THE BODY TO PHYSICAL LOAD AFTER A LOSS OF BLOOD [ADAPTATSIIA ORGANIZMA K FIZICHESKOI NAGRUZKE POSLE KROVOPOTERI]
K. MARKEVICH, M KHOLEVA, and L GURSKI Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Nov 1982, p 56, 57. In Russian

The adaptation of healthy males 19-23 years of age to a short period of physical exercise after a single loss of blood was investigated. Various physiological parameters, such as the heart rate, blood pressure, and biochemical parameters of the blood, were measured before and after 400 ml of whole blood were taken from the subjects. Ergometric tests at a physical working capacity of 170 were also conducted. Results show that immediately following the loss of blood, the subjects exhibited an insignificant dilution of the circulating blood which was more pronounced after 24 hr The pattern of the systole of the left ventricle of the heart was changed one hour following the blood loss This was characterized by a lengthening of the phase of the expulsion of the blood from the ventricles and a shortening of the tension phase. The contraction phase of the left ventricle of the heart returned to its initial value 24 hr after the blood loss. The reaction of the subjects to physical exercise was found to be identical both before and after the blood loss. N.B.

A83-33303
THE INTERRELATION OF THE PARAMETERS OF THE CARDIORESPIRATORY SYSTEM IN ATHLETES DURING VARIOUS CONDITIONS [VZAIMOSVIAZ' POKAZATELEI KARDIORESPIRATORNOI SISTEMY U SPORTSMENOV PRI RAZLICHNYKH SOSTOIANIIAKH]
I. M. SEZIN, IU D. SAFONOV, and V. A. SILUIANOVA (Voronezhskii Meditsinskii Institut, Voronezh, I Moskovskii Meditsinskii Institut, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Nov. 1982, p 22-24. In Russian refs

The correlations between the parameters of the cardiorespiratory system (CRS) were investigated in 60 athletes at various stages of athletic training. The functional condition of the cardiovascular system was evaluated according to parameters of arterial oscillography, rheography, lower extremities, and ballistocardiography. Among other results, it is found that to maintain a determined level of CRS functioning at rest requires a high coordination of various regulatory mechanisms, a high degree of autonomy of separate functional systems, and an economical expenditure of energetic resources The CRS is determined to have a limited potential for forming new functional connections in response to physical loads A parameter is proposed which reflects the reserve potential of each reacting link of the CRS to physical loads, as well as the total size of the reaction range of the functional links included N.B.

A83-33304
AN EVALUATION OF MUSCLE FORCES ACCORDING TO THE ELECTRICAL ACTIVITY OF MUSCLES DURING ATHLETIC EXERCISES IN 'LOADLESS' CONDITIONS [OTSENKA MYSHECHNYKH USILII PO ELEKTRICHESKOI AKTIVNOSTI MYSHTS PRI VYPOLNENII SPORTIVNYKH UPRAZHNENII V 'BEZNAGRUZOCHNYKH' USLOVIIAKH]
A. V. KOVALIK (Penzenskii Zavod-VTUZ, Penza, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Nov. 1982, p 26-29 In Russian. refs

A83-33305
THE CHARACTERISTICS OF THE CHANGES OF SEVERAL BIOCHEMICAL PARAMETERS OF THE BLOOD DURING THE TESTING OF THE GENERAL ENDURANCE OF MIDDLE DISTANCE RUNNERS [OSOBENNOSTI IZMENENIIA NEKOTORYKH BIOKHIMICHESKIKH POKAZATELEI KROVI PRI TESTIROVANII OBSHCHEI VYNOSLIVOSTI BEGUNOV NA SREDNIE DISTANTSII]
G. G. VERESHCHAKO, A. I. NEKHVIADOVICH, and E. M. TAITS (Belorusskii Institut Fizicheskoi Kul'tury, Minsk, Belorussian SSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Nov. 1982, p. 29, 30 In Russian. refs

A83-33306
PHYSIOLOGICAL AND BIOCHEMICAL METHODS FOR EVALUATING THE FUNCTIONAL CONDITION OF ATHLETES IN CYCLICAL FORMS OF SPORTS [FIZIOLOGO-BIOKHIMICHESKIE METODY OTSENKI FUNKTSIONAL'NOGO SOSTOIANIIA SPORTSMENOV V TSIKLICHESKIKH VIDAKH SPORTA]
T. V. SOLOMINA (Cheliabinskii Gosudarstvennyi Institut Fizicheskoi Kul'tyry, Chelyabinsk, USSR) and I. A. SLOBODCHIKOVA (Cheliabinskii Gosudarstvennyi Universitet, Chelyabinsk, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Nov. 1982, p. 30-32 In Russian. refs

The use of comprehensive physiological and biochemical methods for providing effective dynamic observations of the functional condition of highly-qualified athletes is examined and the results of these indicators are compared with the performance of the athletes. Tests employed include the PWC-170 test (bicycle ergonometer test), evaluation of the functional condition of athletes must be taken into account when planning both short and medium-term training regimes, which should consider the general and athletic physical capabilities of the athletes. The physiological and biochemical methods utilized in this study are found to be effective method for determining the functional condition of athletes. N.B.

A83-33307
THE USE OF A COMBINED PRESSURE AND MEDICATION TREATMENT FOR THE REHABILITATION AND RECOVERY OF THE FUNCTIONS OF THE LOCOMOTOR SYSTEM [PRIMENENIE KOMPLEKSNOGO BARO-MEDIKAMENTOZNOGO VOZDEISTVIIA DLIA REABILITATSII I VOSSTANOVLENIIA FUNKTSII OPORNO-DVIGATEL'NOGO APPARATA]
IU. P. DENISENKO, Z. V. URAZAEVA, O. A. NOVAK, and P. V. DUBILEI (Volgogradskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Kazan, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Nov. 1982, p. 53-55. In Russian refs

A method for the rehabilitation of the functions of the locomotor system following injuries is developed which uses a combination of pressure treatment and locally applied medications. The effectiveness of the pressure therapy for these types of injuries is increased by using it in conjunction with medications applied locally to the region of the muscle damage. The medications act to normalize the metabolic disorders in the damaged muscles, and relieve the pain and the muscular hypertonia. Three short periods of decompression at -100 to -160 mm Hg and two short periods of compression at +60 to +100 mm Hg are used for the pressure treatments. It is found that this method is successful in normalizing several parameters of the uscles following injuries to the locomotor system. N.B.

A83-33308
THE USE OF BIOCHEMICAL INDICATORS IN A CONTROLLED TRAINING PROCESS FOR HIGHLY-TRAINED BIATHLON PARTICIPANTS [ISPOL'ZOVANIE BIOKHIMICHESKIKH POKAZATELEI UPRAVLENII TRENIROVOCHNYM PROTSESSOM VYSOKOKVALIFITSIROVANNYKH BIATLONISTOV]
A. M. KHNYKINA and L. S. VOZNESENSKII (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Nov. 1982, p. 24-26. In Russian. refs

The use of several biochemical indicators as a continuous method for controlling the training of biathlon participants is developed. Biochemical indicators utilized include lactic acid, urea, and the parameters of the acid-base balance. The selection of individual training speed regimes and their control are determined, and the total endurance limit and the intensity of the training are evaluated. The exponential dependence of the amount of lactic acid on the training speed was employed to determine the individual training rates. Normative parameters for five zones of different work intensities are developed according to the changes in the level of lactic acid and the parameters of the acid-base balance. The total endurance limit was evaluated based on the amount of urea in the blood. It is concluded that the use of biochemical indicators for the evaluation of the training exertion for an athlete in a combined dynamic program provides objective information which allows the effective control of the training process for biathlon participants N.B.

A83-33309
A CLINICAL AND ELECTRONEUROMYOGRAPHIC INVESTIGATION OF VEGETATIVE NEUROMUSCULAR SYNDROMES [KLINIKO-ELEKTRONEIROMIOGRAFICHESKOE IZUCHENIE VEGETATIVNYKH NERVNO-MYSHECHNYKH SINDROMOV]
L. O. BADALIAN, G. N. DUNAEVSKAIA, I. A. SKVORTSOV, L. N. KAMENNYKH, L. N. KRYLOVA, E. K. SEPP, V. I. SKVORTSOVA, and G. SH. KHONDKARIAN (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova (ISSN 0044-4588), vol. 82, no. 11, 1982, p. 1601-1607. In Russian. refs

A83-33310
THE ELECTROMYOGRAPHIC CHARACTERISTICS OF THREE FORMS OF MYOTONIA [ELEKTROMIOGRAFICHESKIE OSOBENNOSTI TREKH FORM MIOTONII]
M. IU. CHUCHIN (I Moskovskii Meditsinskii Institut, Moscow, USSR) and M. V. LUKIANOV Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova (ISSN 0044-4588), vol. 82, no. 11, 1982, p. 1637-1644 In Russian. refs

The electromyographic characteristics of three different forms of myotonia (Thomson's myotonia, atrophic myotonia, and a different type of myotonia) were studied in 46 patients. It is found that in the third form of myotonia, the function of the muscle fibers is severely impaired. This failure arises during muscle activity and eventually leads to a clinically observed transient, while in more advanced cases it leads to additional and constant weakness of the muscles and muscle hypertrophy. Data on disorders of the synaptic apparatus were also obtained. The pattern of the development of these disorders concerning neuromuscular conduction and the distal parts of the muscle fibers was examined. In atrophic myotonia, the characteristics of the electrophysiological parameters of the neuromuscular periphery were determined, including a pronounced phase of secondary refractoriness. Thomson's myotonia was found to differ significantly in electrophysiological characteristics from the other two forms of myotonia, with the absence of impairments of muscle fibers as in the third form of myotonia and no pronounced phase of secondary refractoriness as in atrophic myotonia. N.B.

A83-33311
PULMONARY COMPLICATIONS DURING ACUTE DISORDERS OF THE CEREBRAL BLOOD CIRCULATION [LEGOCHNYE OSLOZHNENIIA PRI OSTRYKH NARUSHENIIAKH MOZGOVOGO KROVOOBRASHCHENIIA]
L Z. TEL, P. V. BANNOV, L. F. VAULINA, and L. A KUROPIATNIK (Tselinogradskii Meditsinskii Institut, Tselinograd, Kazakh SSR) Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova (ISSN 0044-4588), vol. 82, no. 11, 1982, p 1662-1665. In Russian. refs

The development of pulmonary complications and edema of the brain was studied using the case histories of 141 patients who died as a result of acute disorders of cerebral blood circulation. The connection of the pulmonary pathology with the survival time of the patients, sex, age, the localization of the lesion, the severity and character of the attack, and the development of brain edema is determined. Results show that 26.2 percent of the patients developed only pulmonary edema, 12.8 percent developed edema combined with pneumonia, 31 2 percent developed pneumonia only, and 29.8 percent did not develop pulmonary complications Pulmonary edema was often found in patients who died in the first hours following cereral hemorrhage, while pneumonia most often occurred in patients with infarcts It is concluded that pulmonary edema is one of the main causes of death for patients in the first few hours after suffering acute disorders of the cerebral blood circulation.N.B

A83-33331
THE SUPPRESSION OF BLOOD PLATELET AGGREGATION WITH IMMUNE COMPLEXES. I - CLINICAL INVESTIGATIONS [PODAVLENIE AGREGATSII TROMBOTSITOV IMMUNNYMI KOMPLEKSAMI. I KLINICHESKIE ISSLEDOVANIIA]
I. K SHKHVATSABAIA, S. G. OSIPOV, K. K. TURLUBEKOV, V N. TITOV, L. V. KASATKINA, and B. A. SIDORENKO (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Biulleten' Eksperimental'noi Biologii i Meditsiny (ISSN 0006-4041), vol 94, Nov. 1982, p 27-29. In Russian. refs

The effect of immune complexes circulating in the blood on the functional activity of blood platelets is investigated in healthy individuals and in patients with ischemic heart disease (IHD) Results show that patients with IHD had increased levels of platelet aggregation and immune complexes compared with healthy individuals No correlation was found between platelet aggregation and the concentration of immune complexes in blood serum treated with 3.5 percent polyethylene glycol. However, a significant reverse correlation between the blood platelet aggregation and the level of small immune complexes in serum treated with 7 percent polyethylene glycol was found in patients with IHD. N B.

A83-33333
THE EFFECT OF T AND B LYMPHOCYTES ON THE PHAGOCYTOTIC ACTIVITY OF POLYMORPHONUCLEAR NEUTROPHILS IN THE PERIPHERAL BLOOD OF HUMANS [VLIIANIE T- I B-LIMFOTSITOV NA FAGOTSITARNUIU AKTIVNOST' POLIMORFNOIADERNYKH NEITROFILOV PERIFERICHESKOI KROVI CHELOVEKA]
T. I. SNASTINA and S. M. BELOTSKII (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Biulleten' Eksperimental'noi Biologii i Meditsiny (ISSN 0006-4041), vol. 94, Nov. 1982, p. 80-82. In Russian. refs

The effects of different subpopulations of lymphocytes on the stimulation of phagocytotic activity in humans are investigated in individuals with purulent infections in order to determine the correlations of lymphocytes with the form and course of the pathologic process Results show that the total population of lymphocytes did not affect the percentage of different types of phagocytes. However, the total population of T lymphocytes and active T lymphocytes were determined to have a strong stimulating effect on the ability of neutrophils for phagocytosis. The T lymphocytes with receptors for rabbit red blood cells and a mixture of B lymphocytes with 'zero' cells were found to decrease the level of phagocytotic neutrophils. The B lymphocytes with receptors for mouse red blood cells were determined to have an inhibitory effect with initially high levels of phagocytotic neutrophils, but a stimulating effect with initially low levels N B

A83-33337
THE DIAGNOSTIC VALUE OF A TEST WITH GRADED PHYSICAL LOAD FOR SEVERAL HEART RHYTHM DISORDERS [DIAGNOSTICHESKAIA TSENNOST' TESTA S DOZIROVANNOI FIZICHESKOI NAGRUZKOI PRI NEKOTORYKH NARUSHENIIAKH RITMA SERDTSA]
E. A. BUSLO, M. I. KOLTUNOVA, and T. E DOBROTVORSKAIA (Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR) Kardiologiia, vol. 22, Nov. 1982, p. 37-41. In Russian. refs

A83-33341
THE AGE CHARACTERISTICS OF CORTICAL AUDITORY EVOKED POTENTIALS [VOZRASTNYE OSOBENNOSTI KORKOVYKH SLUKHOVYKH VYZVANNYKH POTENTSIALOV]
L A. NOVIKOVA and N. V. RYBALKO (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR) Zhurnal Vysshei Nervnoi Deiatel'nosti (ISSN 0044-4677), vol. 32, Nov.-Dec. 1982, p. 1132-1139 In Russian refs

The age-related characteristics of cortical auditory evoked potentials (AEP) evoked by acoustic stimuli of various frequencies and intensities are studied in healthy children 3-16 years of age Results show that the peak latencies of the AEP components vary according to age, especially for the P1, N1, and P2 components. The thresholds of auditory sensitivity in the majority of the children 9-16 years of age coincided with the AEP thresholds, while in 6-10 percent of the cases the threshold of electrocortical reactions were 5 dB lower than those of the auditory sensations An increase in the stimulus to 80 dB led to an increase in the amplitude and the latency components of the AEP in all age groups, while a further increase in the stimulus intensity from 80 to 120 dB led to a reduction in the AEP amplitude in most cases The frequency of this phenomenon dropped with age from 90 percent in children 3-4 years of age to 30 percent in children 15-16 years of age. N.B

A83-33342
THE EFFECT OF SPATIAL-STRUCTURAL STIMULUS PARAMETERS ON THE EVOKED POTENTIALS IN THE VISUAL AND POSTERIOR ASSOCIATIVE AREAS OF THE CORTEX IN HUMANS [VLIIANIE PARAMETROV PROSTRANSTVENNO-STRUKTURIROVANNOGO STIMULA NA VYZVANNYE POTENTSIALY ZRITEL'NOI I ZADNEASSOTSIATIVNOI OBLASTEI KORY U CHELOVEKA]
V. A TOLSTOVA and N. N. ZISLINA (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR) Zhurnal Vysshei Nervnoi Deiatel'nosti (ISSN 0044-4677), vol. 32, Nov.-Dec 1982, p. 1124-1131 In Russian. refs

A83-33343
THE ROLE OF THE CEREBRAL HEMISPHERES IN THE REALIZATION OF THE ADAPTIVE MECHANISMS IN HUMANS (IN CONDITIONS OF SLEEP DEPRIVATION) [O ROLI POLUSHARII GOLOVNOGO MOZGA V REALIZATSII ADAPTIVNYKH MEKHANIZMOV U CHELOVEKA /V USLOVIIAKH DEPRIVATSII SNA/]
A M VEIN, I. G. DALLAKIAN, IA. I LEVIN, and K E. SKAKUN (I Moskovskii Meditsinskii Institut; Tsentral'nyi Nauchno-Issledovatel'skii Institut Refleksoterapii, Moscow, USSR) Zhurnal Vysshei Nervnoi Deiatel'nosti (ISSN 0044-4677), vol. 32, Nov.-Dec. 1982, p. 1164-1166. In Russian. refs

The role of the interhemispheric relationship in conditions of sleep deprivation are studied as an aspect of the realization of the adaptive mechanisms in humans during stressful situations. Experiments were conducted using 20 healthy males, 20-26 years of age, who were subjected to sleep deprivation for 36 hr. Various psychological tests were performed, and the patterns of the stages of sleep and the skin-galvanic reflex (SGR) were measured. Results show that a single period of sleep deprivation evokes definite changes in the psychological status of the subjects, including

changes in the performance of verbal and nonverbal tasks, which indicates an activation of the right hemisphere. This hypothesis is also supported by the finding that both the delta-wave sleep and the SGR measured in the fourth stage of cycle I sleep increase in these conditions. It is suggested that these changes have an adaptive character in healthy individuals during a short stressful condition (a single period of sleep deprivation) in which the right hemisphere exhibits the dominant functional activity. N B.

N83-24143# Pennsylvania Univ., Philadelphia. Medical Center.
TOLERANCE AND ADAPTATION TO ACUTE AND CHRONIC HYPERCAPNIA IN MAN
J M CLARK *In* Undersea Medical Society, Inc Effect of CO2 on Mammalian Organisms 13 p Dec 1982 refs
Avail: NTIS HC A06/MF A01

Some of the adaptations that occur in man when exposed to environments with relatively high concentrations of CO2 are changes in arterial blood concentration of CO2 (PaCO2), cerebrospinal fluid concentration of CO2 (CSF PCO2), pulmonary ventilation (V sub E(L/min, BTPS)), arterial blood ph (pH sub a), cerebrospinal fluid pH (pH sub csf), arterial plasma bicarbonate (HCO3) sub p, and cerebrospinal fluid bicarbonate (HCO3) sub csf. Of these changes man can directly sense only pulmonary ventilation. There is a normal diurnal shift in man of 2-4 mmHg for PACO2. Some of the variations in data for the experiments we performed are probably due to a year's separation of studies and to possible different diets of the subjects Author

N83-24144# Wisconsin Univ., Milwaukee. Dept. of Physiology.
SOME PHYSIOLOGIC CHANGES DURING INHALATION OF 1%-6% CO2 IN MAN AND PONY
H. FORSTER *In* Undersea Medical Society, Inc Effect of CO2 on Mammalian Organisms 10 p Dec 1982 refs
Avail NTIS HC A06/MF A01

Elucidation of mechanisms regulating pulmonary ventilation and arterial blood gas and acid-base status during 15 minute inhalation of 03% to 6% CO2 were determined Secondary interests include the effect of acute CO2 exposure on metabolic rate and tissue storage of CO2. Author

N83-24145# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex. Dept of Physiology
COMMENTS ON PERMISSIBLE CO2 CONCENTRATIONS IN HUMAN SPACE FLIGHT
U C. LUFT *In Undersea Medical Society, Inc Effect of CO2 on* Mammalian Organisms 10 p Dec. 1982 refs
Avail NTIS HC A06/MF A01

Space cabin atmosphere and life support systems with regard to permissible CO2 levels in space flight were reviewed. From experience in submarines and in industry it is generally accepted that an accumulation of CO2 in the inspired air of not more than 2%, producing a partial pressure of 15 mmHg, is subjectively acceptable and compatible with normal activities. A series of experiments where the subjects worked on a bicycle ergometer at progressive work loads to the point of exhaustion while breathing air with and without admixture of low concentrations of CO2 in random sequence unknown to the subject were conducted. Author

N83-24146# Schaefer (Karl E), Old Lyme, Conn.
EFFECT OF CHRONIC EXPOSURE TO LOW CO2 CONCENTRATIONS ON RESPIRATION, ACID-BASE BALANCE, AND TARGET ORGANS
K. E. SCHAEFER *In* Undersea Medical Society, Inc. Effect of CO2 on Mammalian Organisms 14 p Dec. 1982 refs
Avail. NTIS HC A06/MF A01

The effects of chronic exposure to low levels of CO2 (0.7% to 1% CO2) on submarines were found to be similar to those known to occur in chronic hypercapnia induced by higher CO2 concentrations (1.5%, 2%, and 3% CO2) and consisted of an increase in ventilation based on an enlarged tidal volume. During the later periods of exposure, the ventilatory response to CO2 was found to decline. Acid base parameters (blood pH and bicarbonate) exhibited cyclic changes between periods of 'metabolic' and 'respiratory' acidosis that were approximately 20 days long, in contrast to the two phases of 'uncompensated' and 'compensated' respiratory acidosis observed during chronic hypercapnia produced by exposure to higher CO2 concentrations. The cause for this discrepancy seems to be a different renal regulation in low level hypercapnia. Author

N83-24147# Naval Submarine Medical Research Lab., Groton, Conn. Physiology Dept.
PROLONGED LOW-LEVEL CO2 EXPOSURE AND ITS EFFECT ON KIDNEY CALCIFICATION
M. SHEA *In* Undersea Medical Society, Inc Effect of CO2 on Mammalian Organisms 5 p Dec. 1982 refs
Avail· NTIS HC A06/MF A01

Studies of guinea pigs exposed for prolonged periods to 1% CO2 showed two important findings: increased kidney calcification as measured in kidney calcium content, and ultrastructural changes of the lungs involving a proliferation of pneumocyte II cells, considered to be precursors of alveolar lining cells (Type I) and the site of surfactant production. Author

N83-24148# National Cancer Cytology Center, Melville, N.Y.
CO2 HOMEOSTASIS AND CARCINOGENESIS: MAMMALIAN RESPONSE TO AN INCREASINGLY HOSTILE ENVIRONMENT
A E. GOLDSMITH and G F. RYAN (Brookhaven Hospital, Patchogue, N.Y.) *In* Undersea Medical Society, Inc Effect of CO2 on Mammalian Organisms 14 p Dec. 1982 refs
Avail: NTIS HC A06/MF A01

Bone is the body's major reservoir of CO2. It is not unexpected that a bone lesion, Paget's disease, provided our first clue to the possible involvement of chronically elevated CO2 tensions in the pathogenesis of certain diseases. Chronic exposure to CO2 increases bone CO2, calcium, an phosphorus. X-ray diffraction analysis detected in the osteitic bone mineral a complex carbonate rich phosphate that occurs naturally in rock and is able to accommodate relatively large amounts of CO2 as carbonate The physicochemical properties of this substance, including its ready solubility in citrates, might explain the clinical radiographic observations seen in Paget's disease. The presence of this carbonate rich phosphate in osteitic bone mineral and the association of Paget's disease with malignancy have prompted us to consider the carcinogenic effects of elevated CO2 concentrations on mammalian tissue. Author

N83-24153# Joint Publications Research Service, Arlington, Va
PROSPECTS OF USING STIMULATING LASER THERAPY IN OPHTHALMOLOGY
L A. LINNIK, N. I. USOV, P. P. CHECHIN, and O S. PELEPCHUK *In* JPRS USSR Rept.· Life Sci. Biomed. and Behavioral Sci , No. 31 (JPRS-8324) p 24-31 13 Apr. 1983 refs Transl into ENGLISH from Oftalmologicheskiy Zh. (Odessa), no. 4, 1982 p 193-197
Avail: NTIS HC A06

The clinical use of lasers in ophthalmology has a relatively short history, numbering about two decades. The first research is referable to the mid 1960's. The possibility of using lasers in ophthalomology was studied, the specifications for their design refined and the main parameters of radiation defined. As a result of extensive research and designing work by ophthalmologists in collaboration with competent technical enterprises, domestic laser instruments were developed for use in ophthalmology, and indications were elaborated for use of laser radiation in the treatment of a number of eye diseases, and this provided the conditions for clinical use of lasers. Author

N83-24154# Joint Publications Research Service, Arlington, Va.
SO-CALLED LASER STIMULATION OF MACULA LUTEA, AND POSSIBLE THEORETICAL INTERPRETATION OF MECHANISM OF ITS EFFECT
M. M. KRASNOV, A. V. BOLSHUNOV, G G. ZIANGIROVA, and N N PIVOVAROV *In* JPRS USSR Rept. Life Sci Biomed. and Behavioral Sci, No 31 (JPRS-8324) p 32-37 13 Apr 1983 refs Transl. into ENGLISH from Oftalmologicheskiy Zh. (Odessa), no. 4, 1982 p 197-201
Avail: NTIS HC A06

In recent years, several reports have appeared in the Soviet literature use of lasers for photostimulation of the macula in the presence of dysbinocular amblyopia and maculodystrophy. The positive therapeutic response consisted mainly of more less stable improvement of visual acuity. Various laser sources (argon, helium-neon, rudy, neodymium), methods and modes of delivery were used for laser stimulation treatment. Efforts have also been made to explain the mechanism of the stimulating effect of laser radiation Author

N83-24155# Joint Publications Research Service, Arlington, Va
STIMULATING EFFECT OF HELIUM-NEON LASERS ON ACUTE INFLAMMATORY PROCESSES IN THE EYE
G. S. SEMENOVA, I. I VOROBYEVA, V P SEMENOV, and T. P. DONARSKAYA *In* JPRS USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 31 (JPRS-8324) p 38-42 13 Apr 1983 refs Transl. into ENGLISH from Oftalmologicheskiy Zh (Odessa), no. 4, 1982 p 201-204 Previously announced as A83-13603
Avail: NTIS HC A06

The mechanism of effect of lasers is based on absorption of luminous energy by atoms and molecules of compounds, with transformation into thermal, acoustic and mechanical energy of photochemical processes This influences biophysical and biochemical processes in tissues, and has a positive effect on functional state of the nervous, vascular and skeletomuscular systems of man The interest in use in medicine of gas (helium-neon, argon) lasers, which are characterized by monochromatic and coherent radiation, is related to the absence of a marked thermal effect and presence of distinct stimulating effect on biological objects. Author

N83-24156# Joint Publications Research Service, Arlington, Va.
STIMULATING LASER THERAPY FOR CORNEAL DISEASES USING RUBY LASERS
Y. S. LIBMAN, Y. I. KIYKO, and S. V IVANOV *In* JPRS USSR Rept: Life Sci. Biomed. and Behavioral Sci, No. 31 (JPRS-8324) p 43-47 13 Apr 1983 refs Transl into ENGLISH from Oftalmologicheskiy Zh (Odessa), no. 4, 1982 p 204-207
Avail NTIS HC A06

In recent years, the attention of scientists was specially drawn to the effects of low power laser radiation on various biological processes. Experimental and clinical studies offer convincing evidence of the fact that low tensity monochromatic laser radiation has stimulating properties, which can help normalize certain pathological states Lasers generating in the red part of the spectrum, in particular helium-neon lasers, have the highest stimulating activity, low-powered helium-neon laser radiation is used in the treatment of trophic ulcers and wounds that do not heal for a long time. Author

N83-24157* National Aeronautics and Space Administration, Washington, D. C
AEROSPACE MEDICINE AND BIOLOGY. A CONTINUING BIBLIOGRAPHY WITH INDEXES
Apr. 1983 79 p
(NASA-SP-7011(244), NAS 1.21 7011(244)) Avail: NTIS HC $7.00 CSCL 06E

This bibliography lists 286 reports, articles and other documents introduced into the NASA scientific and technical information system in March 1983 Author

N83-24158*# Rockefeller Univ, New York.
VESTIBULAR-INDUCED VOMITING AFTER VESTIBULOCEREBELLAR LESIONS
A. D MILLER and V J. WILSON 1982 10 p refs
(Contract NAG-2164; NSG-2380; NIH-NS-02619)
(NASA-CR-170276; NAS 1 26:170276) Avail: NTIS HC A02/MF A01 CSCL 06E

Vestibular stimulation, by sinusoidal electrical polarization of the labyrinths of decerebrate cats which can produce vomiting and related activity which resembles motion sickness was examined. The symptoms include panting, salivation, swallowing, and retching as well as vomiting. These symptoms can be produced in cats with lesions of the posterior cerebellar vermis. It is suggested that a transcerebellar pathway from the vestibular apparatus through the nodulus and uvula to the vomiting center is not essential for vestibular induced vomiting and the occurrence of many symptoms of motion. E.A K

N83-24159*# Rockefeller Univ., New York.
VOMITING CENTER REANALYZED: AN ELECTRICAL STIMULATION STUDY
A D. MILLER and V. J. WILSON 1982 15 p refs
(Contract NAG-2164, NSG-2380; NIH-NS-02619)
(NASA-CR-170272; NAS 1 26:170272) Avail: NTIS HC A02/MF A01

Electrical stimulation of the brainstem of 15 decerebrate cats produced stimulus-bound vomiting in only 4 animals Vomiting was reproducible in only one cat Effective stimulating sites were located in the solitary tract and reticular formation. Restricted localization of a vomiting center, stimulation of which evoked readily reproducible results, could not be obtained Author

N83-24160*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BED-REST STUDIES: FLUID AND ELECTROLYTE RESPONSES
J E GREENLEAF Apr. 1983 17 p refs Presented at the Space Physiol. Conf., Toulouse, 1-4 Mar. 1983
(NASA-TM-84357; A-9299; NAS 1.15 84357) Avail NTIS HC A02/MF A01 CSCL 06P

Confinement in the horizontal position for 2 to 3 weeks results in a chronic decrease in plasma volume, increased interstitial fluid volume, and unchanged or slightly increased extracellular fluid volume Concentrations of blood electrolytes, glucose, and nitrogenous constituents remain within normal limits of variability when maintenance levels of isometric or isotonic exercise are performed for 1 hr/day. Hematocrit and plasma osmolality can be elevated significantly throughout bed rest (BR) Significant diuresis occurs on the first day, and increases in urine Na and Ca continue throughout BR, although voluntary fluid intake is unchanged. Urine Na and K are evaluated during the second week of BR in spite of stabilization of PV and extracellular volume. The initial diuresis probably arises from the extracellular fluid while subsequent urine loss above control levels must come from the intracellular fluid Preservation of the extracellular volume takes precedance over maintenance of the intracellular fluid volume The functioning of a natriuretic factor (hormone) to account for the continued increased loss of Na in the urine is suggested A.R.H.

N83-24161# Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
A REAL-TIME DISTRIBUTED MULTIMICRO SYSTEM FOR NEUROPHYSIOLOGICAL INVESTIGATIONS
M BORGHESI and M PISSARELLO (Polytechnic of Milan) 1982 11 p refs Presented at Real-Time Systems Symp., Los Angeles, 7-9 Dec 1982
(CISE-1865) Avail. NTIS HC A02/MF A01

A real time Distributed Multimicro System specifically designed and implemented to study pathologic conditions of the ear is discussed Based on the identified control algorithm, the set of operations to be executed was defined. High computational burden involved by operations calls for a processing element with a high throughput rate Functional features, processing element,

interelement links, and the real time operating system are discussed Author

N83-24162# Research Inst. of National Defence, Umea (Sweden)
ORAL INTAKE OF RADIONUCLIDES IN THE POPULATION. A REVIEW OF BIOLOGICAL FACTORS OF RELEVANCE FOR ASSESSMENT OF ABSORBED DOSE AT LONG TERM WASTE STORAGE
L JOHANSSON Nov 1982 62 p refs
(FOA-C-40161-W4) Avail NTIS HC A04/MF A01

Dose factors of some radionuclides were reviewed with respect to a chronic oral intake by members of the public. The radionuclides taken into account are Pu(239), Np(237), Ra(226), Th(230), Pa(231), Tc(99), and I(129) all of which might be of potential hazard at a long term storage disposal. The parameter that has the major influence on the dose factor, for most of the radionuclides studied, is the uptake from the gut. In order to assess the dose factor it is therefore essential to make a good estimate of the gastrointestinal uptake of the radionuclides under the actual conditions. The annual limit of intake (ALI) given in ICRP 30, is intended to be applicable on a population of workers, and for a single intake. Since the gut uptake figures in the ICRP-publication are based mainly on uptake values received in experimental animals, given single relatively large oral doses of the isotope studied. From a review of current litteratur, gut absorbation factors and dose factors, for use for members of the public at a chronic oral intake, are suggested Author

N83-24163# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div
ZONOGRAPHIC DIAGNOSIS OF DISEASES OF THE INTERVETEBRAL DISK IN THE LIGHT OF OUR OWN EXPERIMENTS
S. BRYC and J ZLOMANIEC 6 Jan 1983 14 p refs Transl. into ENGLISH from Ann. Univ. M. Curie-Sklodowska (Poland), v 34, no 17, 1979 p 123-132
(AD-A123992; FTD-ID(RS)T-1373-82) Avail NTIS HC A02/MF A01 CSCL 06E

The correctness of diagnosis and accurate definition of pathological changes established by planigraphic examination and zonography are examined. Results obtained by the new diagnosic method are reported E A.K

N83-24164# Army Research Inst. of Environmental Medicine, Natick, Mass.
PHYSIOLOGICAL FACTORS AFFECTING UPPER BODY AEROBIC EXERCISE
M. N SAWKA, M. E. FOLEY, N. A. PIMENTAL, and K. B PANDOLF 23 Aug 1982 21 p refs
(AD-A121511; USARIEM-M39/82) Avail NTIS HC A02/MF A01 CSCL 06S

This study examined the influence selected physiological measurements have upon peak oxygen uptake (peak VO2) elicited by upper body (arm crank) exercise employing crank rates of 30 and 70 rpm Nine male volunteers completed: two maximal effort arm crank tests, one cycle exercise maximal aerobic power (AP) test, measurements of isokinetic elbow extension strength (ES), isometric grip strength (GS), and arm volume (AV). Partial correlation coefficients (R) were obtained from a multiple regression analysis. For the 30 rpm protocol, peak VO2 was strongly related to AP ($r = 0.80$; $R = 0.51$) and moderately related to ES ($R = -0.41$; $R = -0.41$) and GS ($R = 0.40$; $R = 0.30$). For the 70 rpm protocol, peak VO2 was found to be strongly related to AP ($R = 0.94$; $R = 0.88$). AV values were not found to have a marked influence on upper body peak VO2 at either crank rate. These data indicate that aerobic power for cycle exercise is the most important determinant of upper body aerobic exercise performance. Author (GRA)

N83-24165# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario)
THE MAXIMAL EXERCISE TREADMILL STRESS TEST, CURRENT USES AND LIMITATIONS IN CORONARY ARTERY DISEASE
W F LEWIS Sep. 1982 19 p refs Presented at the CFMS Clinical Conf., Berchtesgaden (West Germany), 1-3 Jun. 1982
(AD-A121748, DCIEM-82-R-47) Avail: NTIS HC A02/MF A01 CSCL 06E

Considerable controversy surrounds the clinical value of exercise stress testing, particularly in the diagnosis of coronary artery disease (CAD) For example, ECG ST segment depression during exercise (the classic criterion for a positive test) may have only limited diagnostic worth in a population with low disease prevalence. Conversely, a negative test result may have questionable value in a population with high disease prevalence. On the other hand, ST segment measurement represents only one important observation that can be made during the test procedure: increased predictive accuracy for CAD may result if additional clinical patient responses (e.g , blood pressure) are considered along with ECG interpretation A review of recent literature indicates that a critical evaluation of the clinical importance of exercise stress testing continues. This paper presents current applications and limitations of exercise stress testing in CAD, and examines the predictive accuracy of this diagnostic approach Author (GRA)

N83-24166# School of Aerospace Medicine, Brooks AFB, Tex Radiation Sciences Div
KIEL, JOHNATHAN L. Final Report, Jan. - Jun. 1982
Oct. 1982 21 p refs
(Contract AF PROJ 7757)
(AD-A121792, SAM-TR-82-38) Avail: NTIS HC A02/MF A01 CSCL 06E

This report provides an overview of the medical applications of radiofrequency radiation (RFR) hyperthermia. RFR has limitations in focusing and penetration but can heat tissue selectively, on the basis of water content and dielectric properties nonionizing electromagnetic radiation may operate through several mechanisms, which are determined by the amount of energy deposited in tissues and the type of tissue irradiated. These attributes imply great versatility in the clinical applications of RFR. Furthermore, the synergistic activity of RFR with ionizing radiation and chemotherapy in cancer treatment increases their effectiveness at lower doses. Lowered toxicity is a direct consequence of a lower effective dose in the presence of RFR. With improved therapeutic instrumentation and dosimetry and a better understanding of bioeffect mechanisms, the number of medical applications and the effectiveness fof RFR should continue to increase. Author (GRA)

N83-24167# New York State Dept. of Health, Albany
BIOCHEMICAL CHANGES IN BLOOD COMPONENTS AFTER LETHAL DOSES OF RADIATION Final Report, Oct. 1980 - Sep. 1981
A M. MAGRO Oct. 1982 28 p refs
(Contract F33615-78-D-0617; AF PROJ. 7757)
(AD-A121815; SAM-TR-82-27) Avail NTIS HC A03/MF A01 CSCL 06R

Nonpeptide, peptide, and protein blood components were measured postirradiation in Wistar rats to investigate biochemical changes that might be related to or form the basis of radiation-induced emesis. The rats were irradiated with lethal doses of radiation, and blood components were analyzed at various times postirradiation. The blood-component levels were compared to those of nonirradiated controls to determine if any significant changes occurred due to the radiation. GRA

N83-24168# School of Aerospace Medicine, Brooks AFB, Tex Crew Performance Branch

FATIGUE, WORKLOAD, AND PERSONALITY INDICES OF AIR TRAFFIC CONTROLLER STRESS DURING AN AIRCRAFT SURGE RECOVERY EXERCISES Final Report, Apr. - Dec. 1981

S. M. ROKICKI Oct. 1982 15 p refs
(Contract AF PROJ 2729)
(AD-A121908; SAM-TR-82-31) Avail: NTIS HC A02/MF A01 CSCL 06S

During an aircraft surge recovery exercise, stress survey instruments were administered to 25 USAF air traffic controllers. The survey instruments consisted of sleep reports, fatigue and workload scores, and the State-Trait Personality Inventory (STPI). The STPI yields scores to measure anxiety, curiosity, and anger Data were collected for a 4-day period during the exercise, with a maximum of 22 controllers participating on any single day. The data were collected to provide a baseline for comparison with future studies involving chemical warfare defense equipment. Although the controllers averaged more than 7 hours sleep per night during the exercise period, 70% felt they could have used more sleep The average subjective fatigue level never suggested more than moderate fatigue. The average perceived workload corresponded to a challenging but manageable level. Average State scores for anxiety, curiosity, and anger were generally low; average Trait scores for these same emotions were below scores reported for Navy recruits and college freshmen During the course of the exercise, significant differences were found in State anxiety scores, as the novel situation (the exercise) became a familiar routine. The major conclusion is that the surge recovery exercise, in comparison to normal duty conditions, had minimal effect on all measures for this group of controllers. Author (GRA)

N83-24169# Aeronautical Research Labs., Melbourne (Australia).

INVESTIGATION OF DISCREPANCIES IN MEASUREMENTS MADE WITH A MINILAB WBGT INDEX METER

A. ROSS Sep 1982 27 p
(AD-A122972; ARL/SYS-TM-64; AR-002-908) Avail: NTIS HC A03/MF A01 CSCL 14B

Measurements of wet bulb, dry bulb, globe temperatures and WBGT Index made with a particular 'MINILAB' were found to be mutually inconsistent. An investigation into the source of the discrepancies showed that they were largely methodological and attributable to the instrument Individual measurements of wet, dry and globe temperatures were found to be reliable. GRA

N83-24170# National Academy of Sciences - National Research Council, Arlington, Va. Ad Hoc Committee on Polar Biomedical Research.

POLAR BIOMEDICAL RESEARCH: AN ASSESSMENT Technical Report, 15 Dec. 1980 - 30 Sep. 1982

Sep. 1982 94 p refs
(Contract DAMD17-81-C-1012)
(PB83-119081) Avail. NTIS HC A05/MF A01 CSCL 06S

A committee of physicians, social scientists, and biologists reviews polar biomedical research, identifies research needs, and recommends priorities. Main conclusions are that psychocultural, compared with purely biological, factors will continue to generate a disproportionately large share of polar medical problems, that improving awareness and application of the biomedical data that exist in private and government data banks is a top priority, and that greater emphasis on polar biomedicine in educational curricula and professional society activities is urgent. GRA

N83-24171# National Academy of Sciences - National Research Council, Arlington, Va. Ad Hoc Committee on Polar Biomedical Research.

POLAR BIOMEDICAL RESEARCH: AN ASSESSMENT. APPENDIX: POLAR MEDICINE, A LITERATURE REVIEW Technical Report, 1940 - 1981

F C KOERNER 1982 95 p
(Contract DAMD17-81-C-1012)
(PB83-119099) Avail NTIS HC A05/MF A01 CSCL 06S

A bibliography of 729 documents on polar biomedical research covering the period 1940-1981 is presented and briefly reviewed under the headings: Nutrition, Physiologic Changes during Polar Life, and Pathologic Changes during Polar Life. GRA

N83-25346* National Aeronautics and Space Administration. Pasadena Office, Calif.

SYSTEM AND METHOD FOR MOVING A PROBE TO FOLLOW MOVEMENTS OF TISSUE Patent

C. FELDSTEIN (JPL, California Inst of Tech., Pasadena), T W. ANDREWS (JPL, California Inst. of Tech., Pasadena), D W. CRAWFORD (JPL, California Inst. of Tech , Pasadena), and M. A. COLE, inventors (to NASA) (JPL, California Inst of Tech , Pasadena) 15 May 1981 6 p Filed 15 May 1981 Supersedes N81-26697 (19 - 17, p 2379)
(NASA-CASE-NPO-15197-1, US-PATENT-4,378,813, US-PATENT-APPL-SN-263957, US-PATENT-CLASS-128-774; US-PATENT-CLASS-128-782; US-PATENT-CLASS-128-303B)
Avail. US Patent and Trademark Office CSCL 06B

An apparatus is described for moving a probe that engages moving living tissue such as a heart or an artery that is penetrated by the probe, which moves the probe in synchronism with the tissue to maintain the probe at a constant location with respect to the tissue. The apparatus includes a servo positioner which moves a servo member to maintain a constant distance from a sensed object while applying very little force to the sensed object, and a follower having a stirrup at one end resting on a surface of the living tissue and another end carrying a sensed object adjacent to the servo member. A probe holder has one end mounted on the servo member and another end which holds the probe.
Official Gazette of the U.S. Patent and Trademark Office

N83-25347* National Aeronautics and Space Administration, Washington, D C

AEROSPACE MEDICINE AND BIOLOGY: A CUMULATIVE INDEX TO THE 1982 ISSUES

Jan 1983 626 p
(NASA-SP-7011(241), NAS 1.21.7011(241)) Avail: NTIS HC $12.00 CSCL 06E

This publication is a cumulative index to the abstracts contained in the Supplements 229 through 240 of Aerospace Medicine and Biology: A continuing Bibliography. It includes three indexes. subject, personal author, and corporate source. Author

N83-25348*# California Univ., San Diego

RESEARCH EFFORTS Final Report

M. G ZIEGLER 1 Apr 1983 13 p refs
(Contract NAS9-16312)
(NASA-CR-171654; NAS 1.26:171654) Avail: NTIS HC A02/MF A01 CSCL 06E

Conjugated catecholamines, deconjugation of catecholamines in cerbrospinal fluid or urine, the relationship of plasma norepinephrine to levels of severe stress, and catecholamine clearance rates are discussed Author

N83-25349*# National Aeronautics and Space Administration, Washington, D. C.

SPACE PHYSIOLOGY AND MEDICINE

A. E. NICOGOSSIAN and J. F. PARKER, JR. (BioTechnology, Inc.) 1982 331 p refs
(NASA-SP-447; NAS 1 21:447; LC-82-23047) Avail: NTIS HC $15.00/MF A01 CSCL 06P

The state of knowledge in space physiology and medicine are reviewed. Overviews of manned space flight, the space

environment, spaceflight systems and procedures, physiological adaptation to space flight, health maintenance of space crew members, and medical problems of space flight are presented.
S L

N83-25350*# Texas A&M Univ., College Station. Veterinary Nuclear Medicine Section
STUDY OF BEHAVIORAL MODIFICATIONS RESULTING FROM EXPOSURE TO HIGH LET RADIATION Final Report
D. HIGHTOWER, B. BEAVER, and C. L. HALL 1982 65 p
(Contract NAS9-16375)
(NASA-CR-171651; NAS 1.26:171651) Avail NTIS HC A04/MF A01 CSCL 06R

Animal irradiations, behavioral studies, neurological studies, and nuclear medicine studies are discussed. Author

N83-25351# Tulane Univ., New Orleans, La. School of Medicine.
CERVICAL SPINE STIFFNESS AND GEOMETRY OF THE YOUNG HUMAN MALE
Y. K. LIU, K. W. KRIEGER, G. NJUS, K UENO, and M CONNORS Wright-Patterson AFB, Ohio Aerospace Medical Research Labs. Nov 1982 259 p refs
(Contract F33615-76-C-0526; AF PROJ 7231)
(AD-A123535, AFAMRL-TR-80-138) Avail: NTIS HC A12/MF A01 CSCL 06S

Injuries to the cervical spine incurred during emergency escape from high-performance aircraft are of concern to the Air Force To provide for safety design, especially in view of newly considered additional head encumbrances such as helmet-mounted sights and displays, and chemical protection equipment, a detailed dynamic structural model of the human head-spine system has been developed The presently described effort addresses the collection of cervical spine geometric, material property and failure data for use with this model Author (GRA)

N83-25352# Naval Health Research Center, San Diego, Calif
SALIVARY AND PLASMA TESTOSTERONE AND CORTISOL DURING MODERATELY HEAVY EXCERCISE Interim Report
R. R VICKERS, JR., J. A HODGDON, B L. BENNETT, R. E. POLAND, and R. T RUBIN Apr. 1982 11 p refs
(Contract M0096PN001)
(AD-A122107; NAVHLTHRSCHC-82-5) Avail. NTIS HC A02/MF A01 CSCL 06E

Saliva may provide a useful alternative to blood for measuring steroid hormones. total plasma and salivary concentrations of cortisol and testosterone were compared in samples taken twice at rest and twice during exercise to determine whether physical activity level affects the relationship between the two. Correlations were consistently high ($r>.82$) for cortisol, but relatively low for testosterone ($r<.66$). Exercise did not affect either correlation. Salivary cortisol is a reasonable alternative to plasma cortisol even during exercise. The testosterone results were equivocal as salivary testosterone could be highly correlated with free plasma testosterone despite the low correlation to total plasma testosterone. Closer examination of the free/total plasma hormone distinction was not possible in the present study, but should be an important focus for further research on salivary steroids.
GRA

N83-25353# New York Univ. Medical Center. Dept. of Ophthalmology.
INTRACORTICAL INTERACTIONS FOR ORIENTATION CONTRAST Final Technical Report, 1 Jun. 1981 - 31 Mar. 1982
J. I. NELSON 31 May 1982 29 p refs
(Contract N62269-81-C-0279)
(AD-A123326; NADC-82199-60) Avail. NTIS HC A03/MF A01 CSCL 05R

To further our understanding of visual perception at the cellular level, recordings have been made from single neurons in the visual cortex (Area 17) of the cat. It is known that the visual scene is dissected at this level of the visual system according to stimulus attributes of objects in the real world such as color, depth, direction of motion, and orientation as well as position in the visual field. The selectivity of neurons for stimulus orientation has been particularly studied under this contract. The existence of consistent error in perceived orientation has long been known. Such orientation contrast effects are a component in many well-known optical illusions or figural illusions Mechanisms have been sought in striate cortex (Area 17) which would explain these sensory coding errors. Both inhibitory and facilitatory interactions have been discovered and studied. Their properties are appropriate for a mechanisms of certain other perceptual effects as well as for orientation contrast. Further study of intracortical interactions would provide the knowledge for synthesizing into higher percepts the local visual analysis we now understood on a cell-by-cell basis.
Author (GRA)

N83-25354# Naval Health Research Center, San Diego, Calif
L-TRYPTOPHAN: EFFECTS ON DAYTIME SLEEP LATENCY AND THE WAKING EEG Final Report, Aug. 1978 - Oct. 1982
C. L SPINWEBER, R. URSIN (Bergen Univ., Norway), R. P. HILBERT, and R. L. HILDERBRAND 22 Oct. 1982 18 p refs
(Contract MR0000101; MR04101003)
(AD-A123633, NAVHLTHRSCHC-82-24) Avail: NTIS HC A02/MF A01 CSCL 06P

The essential amino acid, l-tryptophan, has been shown to reduce sleep latency when administered in doses ranging from 1-15 grams. Because l-tryptophan is regularly ingested in dietary protein foods, it has been called a 'natural hypnotic.' At least one author has suggested that plasma tryptophan, which shows a diurnal rhythm with peak levels in the late evening hours, may be a physiological regulator of sleep onset. However, not all researchers have found that l-tryptophan reduces sleep latency There is also controversy about whether l-tryptophan administration alters the pattern of EEG-recorded sleep Finally, the underlying mechanism for the putative hypnotic effects has not been well-established, although serotonergic systems are most likely involved. We conducted this study to determine the effects of l-tryptophan (4 g) on the waking EEG and on daytime sleep. Twenty normal, drug-free adults participated Subjects were assigned to a morning or afternoon group, and data were collected on two occasions, after l-tryptophan and after placebo, assigned in a counter-balanced order. Blood samples were obtained by venepuncture and later analyzed for total and free tryptophan levels Daytime nap sleep was recorded and scored according to usual procedures. Waking EEGs were digitized on-line and later analyzed for changes in five frequency bands: 16-40 Hz (beta), 13.0-15.5 Hz (sigma), 8.0-12 5 Hz (alpha), 4.0-7.5 Hz (theta), and 0.5-3 5 Hz (delta). GRA

N83-25355# Fels Research Inst., Yellow Springs, Ohio.
LONGITUDINAL STUDY OF HUMAN HEARINGS: ITS RELATIONSHIP TO NOISE AND OTHER FACTORS. 3: RESULTS FROM THE FIRST FIVE YEARS Draft Report, 16 Apr. 1979 - 15 Jun. 1981
A. F. ROCHE, W. C CHUMLEA, and R M. SIERVOGEL Wright-Patterson AFB, Ohio AMRL Sep. 1982 219 p refs
(Contract F33615-79-C-0526; AF PROJ. 7231)
(AD-A123175; AFAMRL-TR-82-68-PT-3) Avail NTIS HC A10/MF A01 CSCL 06S

Analyses have been made of serial data from children aged 6 to 18 years. These data relate to auditory thresholds, noise exposure obtained from questionnaires and dosimetry records and the results of otoscopic, tympanometric and speech discrimination tests. For those children also enrolled in the Fels Longitudinal Study of Growth and Development, there are serial data for body size, maturity, and blood pressure. GRA

N83-25356# Florida Univ., Gainesville. Dept of Physiological Sciences.
ANALYSIS OF LONG BONE AND VERTEBRAL FAILURE PATTERNS Interim Report, 19 Feb. - 30 Sep. 1982
J A C EURELL 30 Sep 1981 4 p
(Contract AF-AFOSR-0130-80, AF PROJ 2312)
(AD-A123163; AFOSR-82-1067TR) Avail: NTIS HC A02/MF A01 CSCL 06P

Baboons were dropped vertically from four feet above the ground The vertebral columns were examined with scanning electron microscopy and light microscopy six months and six years post-impaction. The posterior articulations of the vertebrae had osteoarthritic changes which were probably related to changes previously observed in the anterior portion of the column. These changes seemed to increase in severity with time following the impaction sequence and were probably impaction related GRA

N83-25357# Federal Aviation Administration, Washington, D.C. Office of Systems Engineering Management
THE EFFECTS OF PHYSICAL FATIGUE AND ALTITUDE ON PHYSIOLOGICAL, BIOCHEMICAL, AND PERFORMANCE RESPONSES
E. A. HIGGINS, H W. MERTENS, J. M. MCKENZIE, G. E. FUNKHOUSER, M A. WHITE, and N. J MILBURN May 1982 27 p refs
(AD-A122796; FAA-AM-82-10) Avail: NTIS HC A03/MF A01 CSCL 06S

Twelve healthy young men were evaluated in each of four experimental conditions involving the possible combinations of two exercise conditions given prior to performance testing (1 h of heavy exercise vs. no exercise) and two altitude conditions (ground level vs. 12,500 ft) which were administered during performance testing. Performance was measured during a 2 1/4-h test session with the Multiple Task Performance Battery (MTBP) which involved time-shared performance in monitoring of warning lights and meters, mental arithmetic, problem solving, and tracking Heart rate was statistically higher after exercise than after no exercise and statistically higher at 12,500 ft than at ground level Norepinephrine excretion was higher during exercise experiments than during no-exercise experiments. There was no altitude effect for this measurement. The overall composite score of MTPB performance was significantly lower at 12,500 ft than at ground level. The adverse effect of higher altitude was greatest in the tracking task. The 1-h period of vigorous physical exercise had no statistically significant main effect on overall MTPB scores Residual effects of exercise resulting in increased arousal may account for the tendency for performance to be slightly higher in the case of problem solving The interaction of altitude with exercise was also significant in the case of tracking performance. The most important aspect of the interaction was that tracking performance was significantly better at 12,500 ft following exercise GRA

N83-25358# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN ASSESSMENT OF THE RELATIONSHIP BETWEEN THE CORONARY-PRONE (TYPE A) BEHAVIOR PATTERN, STRESS, AND CORONARY HEART DISEASE M.S. Thesis
T. J. MCDONALD Sep 1982 165 p refs
(AD-A122809, AFIT-LSSR-32-82) Avail: NTIS HC A08/MF A01 CSCL 06E

This cross-sectional study examines the relationships between the coronary-prone (Tpe A) behavior pattern, stress, and coronary heart disease (CHD). Past research indicates that Type A behavior is related to both CHD and stress Behavioral and organizational data were obtained from 438 respondents; physiological data were obtained from 368 respondents The physiological data included cholesterol, HDL cholesterol (HDL), and cortisol. Cholesterol, HDL, and the ratio of cholesterol divided by HDL (ratio) were used as indicators of CHD. Cortisol was used as the indicator of felt stress. Factor analysis and multiple regression analysis were employed Analyses supported using ratio, cholesterol, and HDL as indicators of CHD; cortisol was not representative of felt stress. The results indicate that Type A behavior and its job involvement dimension are only weakly and positively related to CHD. The speed and impatience dimension demonstrated a stronger, positive relationship with CHD The hard driving and competitive dimension was inversely related to CHD, with the competitive component controlling the direction of the relationship. GRA

N83-25359# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio School of Systems and Logistics.
AIR FORCE PHYSICAL FITNESS: AS ASSESSMENT OF CHARACTERISTICS AND PROGRAMS WHICH AFFECT INDIVIDUAL PHYSICAL FITNESS M.S. Thesis
R. R. SCHELLHOUS Sep. 1982 190 p refs
(AD-A123022; AFIT-LSSR-63-82) Avail NTIS HC A09/MF A01 CSCL 06N

The Air Force physical fitness program has undergone four major changes since the Air Force became a separate service in 1947 Results of this study indicate that the current fitness program has not yet produced a uniformly high level of physical fitness among Air Force members; only 40 percent of Air Force males are in at least a passing aerobic fitness category, and 20 percent get no weekly aerobic exercise whatsoever. Data collected from a survey questionnaire sent to 1600 randomly selected Air Force members assessed the relationship between individual aerobic fitness (as measured by existing Air Force aerobic activity standards) and several other variables, including age, weight, rank, flying status, perceived degree of supervisory support, and availability, adequacy, and use of installation fitness facilities Individual aerobic fitness is most strongly related to the number of duty hours used for aerobic activities, but fitness is not directly related to degree of adherence to weight standards. Fitness does not depend on support from supervisors and commanders or on the adequacy of existing facilities. Author (GRA)

N83-25360# Naval Health Research Center, San Diego, Calif.
SLEEP SPINDLE AND DELTA CHANGES DURING CHRONIC USE OF A SHORT-ACTING AND A LONG-ACTING BENZODIAZEPINE HYPNOTIC Interim Report
L C. JOHNSON, C L SPINWEBER, W F. SEIDEL, and W. C. DEMENT 10 Nov. 1982 10 p refs Presented at the Ann. Meeting of the Assoc. for the Psychophysiol. Study of Sleep, San Antonio, 16-20 Jun. 1982
(Contract MR04101003)
(AD-A123149; NAVHLTLRSCHC-81-10) Avail. NTIS HC A02/MF A01 CSCL 06O

The goals of this study were to measure EEG sleep changes during 5 weeks of benzodiazepine use, describe the magnitude and pattern of change for a short-acting and a long-acting benzodiazepine, and determine if EEG changes were related to levels of drug in plasma. Twenty-one patients, 4 males and 17 females, mean age 43 + or - 12.7 years, participated. All were diagnosed as chronic insomniacs. After 3 baseline nights, all patients received placebos for 9 nights Patients then received trizolam (0.5 mg), flurazepam (30 mg), or placebo for 37 nights. All patients received palcebo during 10 withdrawal nights. EEG (C3-A2 or C4 -A1) was recorded on FM tape for delta and spindle analysis on 7 of the 59 nights (placebo nights 1 and 7; treatment nights 6, 20, and 34, and placebo withdrawal nights 4 and 120). Detection of delta half waves (0 5-2 0 Hz) and sleep spindle bursts (11 75-15 0 Hz) during NREM sleep was accomplished off-line with the Smith Phasic EEG detector. Blood for plasma analysis was drawn before evening medication on baseline night 5 and treatment nights 3, 7, 21, 35, and on the fifth withdrawal night GRA

N83-25361# Naval Medical Research Inst , Bethesda, Md.
DATA ACQUISITION AND ANALYSIS SOFTWARE FOR THERMAL STRESS STUDIES Final Medical Progress Report
R. P LAYTON Apr 1982 101 p refs
(AD-A122567; NMRI-82-3) Avail: NTIS HC A06/MF A01 CSCL 06P

A system to monitor cutaneous heat flow and temperature at individual body sites using heat flux transducers has been previously reported. Data acquisition for this system has been automated using a desktop computer. Programs have been developed to aid

in the scaling, plotting, and analyzing of experimental data. The details of this software package are the subject of this report.
Author (GRA)

N83-25362# Naval Medical Research Inst., Bethesda, Md.
COMPUTER-ASSISTED SYSTEM FOR DETERMINATION OF O2 CONSUMPTION AND CO2 PRODUCTION IN MAN Final Report
R P. LAYTON and E. T. FLYNN Apr. 1982 43 p refs
(AD-A122525, NMRI-82-1) Avail NTIS HC A03/MF A01
CSCL 06P

Determination of oxygen and carbon dioxide production rates are routinely made in the exercise physiology laboratory. A semi-automated, portable system based on a desktop computer has been developed Expired gas from several breaths, collected in a bag, has its volume measured with a spirometer. The oxygen and carbon dioxide concentrations are directly read by the computer from the appropriate gas analyzers. The computations needed to evaluate oxygen consumption, carbon dioxide production and respiratory exchange ratio are automatically performed and the results immediately displayed. Measured volumes are accurate + or - 0 010 liters absolute and gas concentrations are reproducible to + or - 0 01% absolute. The system is technically simple and can be learned quickly by even relatively inexperienced operators.
GRA

N83-25363# Naval Medical Research Inst., Bethesda, Md.
CALIBRATOR FOR AN ELECTROMAGNETICALLY BRAKED BICYCLE ERGOMETER Final Medical Research Progress Report
R P LAYTON and W. A. TETRAULT Apr. 1982 22 p refs
(AD-A122511, NMRI-82-4) Avail: NTIS HC A02/MF A01
CSCL 06S

The electromagnetically braked bicycle ergometer is frequently used in the exercise physiology laboratory as a source of known workload. Normally the accuracy of the device cannot be verified without returning it to the factory for recalibration, a costly and time-consuming process. An instrument that can provide either a quick check of the proper functioning of an ergometer or a highly accurate calibration curve is the subject of this report
Author (GRA)

N83-25364# California Univ., La Jolla. Dept. of Psychiatry.
SLEEP LOSS EFFECTS ON CONTINUOUS SUSTAINED PERFORMANCE Final Report, Mar. 1981 - Nov. 1982
D. J. MULLANEY, D. F KRIPKE, P. A. FLECK, and N. OKUDAIRA 30 Nov. 1982 44 p refs
(Contract N00014-79-C-0317, DAMD17-78-C-8040)
(AD-A122392; FR-3) Avail NTIS HC A03/MF A01 CSCL 05J

The ability to sustain continuous performance for up to 42 hours was studied with 30 subjects. During each 10 minutes, subjects performed a tracking task, a pattern memory task, an addition task, and provided subjective ratings on sleepiness and attention-fantasy scales plus a brief written description summarizing their thoughts. Of the 10 subjects required to work alone, 4 did not complete the 42 hours and 9 experienced 'psychological events' such as hallucinations, visual illusions, and disorientation. Of the 20 subjects who began the 42-hour task in pairs, 5 did not complete the 42 hours and 13 experienced similar psychological events. The percentage who did not complete the 42 hours of study and the incidence of psychological events were not significantly different for subjects working alone and in pairs. Performance results were very similar. No significant relationship of psychological events to any of our performance measures was demonstrated These results indicate that continuous sustained performance in itself causes rapid deterioration of performance and psychological disturbances, regardless of the presence or absence of social contact.
Author (GRA)

N83-25365# Mason (Virginia) Research Center, Seattle, Wash.
INTERACTION OF ANTI-G MEASURES AND CHEST WALL MECHANICS IN DETERMINING GAS EXCHANGE Annual Progress Report, 1 Apr. 1981 - 31 Mar. 1982
H. I MODELL May 1982 26 p refs
(Contract F49620-79-C-0058; AF PROJ 2312)
(AD-A122297; AFOSR-82-1046TR) Avail: NTIS HC A03/MF A01 CSCL 09S

During the last twelve months, progress has been made in three experimental areas: (1) determination that right ventricular blood provides an accurate mixed venous blood sample in the canine; (2) investigation of gas exchange during repeated canine +Gz exposures; and (3) characterization of pressure-volume relationships of the pig lung and chest wall. It is generally assumed that pulmonary arterial blood best represents mixed venous blood. Under some conditions (e g., during +Gz stress) sampling from this site is difficult. To determine if the right ventricle is as good a sampling site as the pulmonary artery in the dog, samples were drawn from both sites and compared for blood gas composition. No physiologically significant differences were detected between the two sites in this species Results of our earlier studies indicated that exposure to +Gz stress in the presence of G-suit abdominal bladder inflation and breathing air leads to a gas exchange detriment lasting as long as three minutes post-exposure To determine if this detriment is cumulative on repeated exposure, dogs were exposed to two episodes of +Gz stress separated by a three-minute recovery period Blood gas status during the last 20 seconds of each 60-second exposure was assessed. Results indicated that the same degree of detriment occurred during both exposures. Pig chest wall shape and compliance is closer to man's than is the dog chest wall
GRA

N83-25366# School of Aerospace Medicine, Brooks AFB, Tex.
OCULAR THERMAL INJURY FROM INTENSE LIGHT Final Report, Jun. 1981 - Mar. 1982
R. G ALLEN and G. D POLHAMUS Sep. 1982 45 p refs
(Contract AF PROJ. 7757)
(AD-A122226; SAM-TR-82-25) Avail. NTIS HC A03/MF A01
CSCL 06R

Injury from exposure to intense light has been a longstanding concern - particularly ocular damage such as solar eclipse burns, snow blindness, and glass blower's cataracts. The development of intense light sources by man, culminating (to date) with lasers, has increased the possibility of accidental ocular exposures Systematic laboratory study of ocular damage began in the early 1950's and has progressed more or less continuously ever since. Probably the most understood mechanism of injury is that described as thermal Rather thorough models of this mechanism exist and have been validated reasonably well within the limits of their applicability However, other mechanisms of injury (such as acoustical shock waves, and photochemical interactions) have been identified and have received considerable attention in the past decade. The results of the research efforts of many investigators over a considerbale span have been incorporated in numerous laser safety standards, typified by the American National Standards Institute Z136 1 Standard for the Safe Use of Lasers These standards, although carefully conceived and based upon a large body of empirical information, are neither complete nor final and should be updated as additional information is obtained.
Author (GRA)

N83-25367# Oak Ridge National Lab., Tenn. Health and Safety Research Div.
BIOLOGICAL EFFECTS OF STATIC MAGNETIC FIELDS: A SELECTIVE REVIEW WITH EMPHASIS ON RISK ASSESSMENT
C. E. EASTERLY Apr. 1982 78 p refs
(Contract W-7405-ENG-26)
(DE82-013350; ORNL/TM-7860) Avail: NTIS HC A05/MF A01

The status of magnetic field information that is applicable to risk assessment is discussed. Hence, an attempt is made to identify both the literature that is useful to the goal of risk assessment and a framework within which risk assessment methodologies can

be derived. From this selected review, it is concluded that three areas exist for which adequate information can be found to begin modelling disease induction, reproduction and developoment, and cardiovascular response The first two are supported by a combination of positive and negative findings and the last by a calculational technique which utilizes the physically well-known principle of flow retardation for a conducting fluid moving through a magnetic field. DOE

N83-25368# Los Alamos Scientific Lab., N. Mex. Group MP-3
LENS* 4: A PROGRAM FOR CALCULATION OF GEOMETRIC OPTICS OF THE HUMAN EYE
J. D DOSS Oct. 1982 17 p refs
(Contract W-7405-ENG-36)
(DE83-003890; LA-9539-MS) Avail: NTIS HC A02/MF A01

A computer program (LENS* 4) has been written that is used for ray-trace calculations of human or animal eyes The user enters all relevant eye specifications, and the program calculates ray segments from a (specified) external object From the ray calculations, the program yields data on image location, image distance from the retina, retinal spot size, and effective pupil diameter. The program also allows entry of simple corrective lens systems that simulate a contact lens or ordinary spectacles. Graphics output illustrating the eye cross section, corrective lens, and rays is provided either on the CRT, thermal printer, or graphics plotter Although the program is written in BASIC, many of the statements (particularly in the graphics section) are peculiar to the Hewlett-Packard 9845B desktop computer. DOE

53

BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

A83-30023
PATH-GUIDED APPARENT MOTION
R. N. SHEPARD and S L. ZARE (Stanford University, Stanford, CA) Science (ISSN 0036-8075), vol 220, May 6, 1983, p. 632-634 refs
(Contract NSF BNS-80-05517)

A curved gray path, briefly flashed between two alternately displayed black dots, induced a compelling illusion of a single dot moving back and forth over that path. The minimum interval between dot onsets yielding this apparent motion increased not with the direct distance between the dots but, linearly, with the length of the curved path. Author

A83-32468
VISUAL PERCEPTION AND AIDES FOR NOCTURNAL VISION [PERCEPTION VISUELLE ET AIDES ALA VISION NOCTURNE]
J.-P. MENU and G. SANTUCCI (International Academy of Aviation and Space Medicine and SocieteFrancaise de Physiologie et de Medecine Aeronautiques et Cosmonautiques, Congres International du Medecine Aeronautique et Spatiale, 29th, Nancy, France, Sept. 7-11, 1981) Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p 107-111. In French. refs

Night flying at low altitudes is impeded by the necessity of viewing external objects while at the same time necessarily monitoring the avionics displays Coating the instruments with fluorescent substances and bathing them in UV light avoids interference with the pilot's dark-adapted vision when he looks at the instruments and then out the canopy. Night vision is augmented through light amplifiers, IR optics, and terrain following radar. Light amplifiers function by receiving incoming photons, converting them into electronic signals, then directing the signals onto a light-sensitive phosphorescent plate to produce a collimated image. Variations on the technique are implemented with low luminance television and CCD apparatus FLIR scanners can project an image onto a CRT screen, although the field-of-view for all electronic imagery limited to 40 deg, as well as requiring long simulator training to familiarize the pilot to the artificial images. Computerized pretreatment of the imagery for projection with HUDs can yield basic shapes such as triangles, squares, and circles which provide basic information on upcoming obstacles to the pilot M.S K.

A83-32690
AUTOMATIC ACTIVITY AND WORKLOAD DURING LEARNING OF A SIMULATED AIRCRAFT CARRIER LANDING TASK
E. LINDHOLM and C M. CHEATHAM (Arizona State University, Tempe, AZ) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol 54, May 1983, p. 435-439. Research supported by Arizona State University refs
(Contract F49620-79-C-0197)

Heart rate, heart rate variability, and skin conductance responses were continuously recorded from six naive males during learning of a simulated aircraft carrier landing task There were 30 learning trials spanning more than 1 h. Over trials, heart rate decreased while flight performance increased, indicating that heart rate is sensitive to practice effects. Independent of practice, heart rate and skin conductance amplitude always increased during the last minute of final approach to landing. The results supported the following conclusions. (1) heart rate and skin conductance amplitude are reliable indicators of short-term workload increases as typified by final approach, (2) heart rate is a reliable indicator of longer term workload decreases resulting from practice and increased mastery of the task Results are discussed within the framework of autonomic activation theory Author

A83-32691
FLIGHT EXPERIENCE AND NAVAL AIRCRAFT MISHAPS
M S BOROWSKY and R. WALL (U.S Naval Safety Center, Norfolk, VA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, May 1983, p 440-446.

Naval aircraft mishaps involving pilot error for a 5-yr period were analyzed to determine the specific underlying causes as functions of lifetime and recent experience. The data show that certain problems tend to manifest themselves at different levels of experience Moreover, the potential for a mishap itself is correlated with these experience levels. Author

A83-32955
A METHOD OF GROUPING PILOTS BEFORE CARRYING OUT EXPERIMENTS IN FLIGHT SIMULATORS [OB ODNOI METODIKE GRUPPIROVANIIA PILOTOV PERED PROVEDENIEM EKSPERIMENTA NA TRENAZHERE]
N. V. DROZDOV (Kievskii Institut Inzhenerov Grazhdanskoi Aviatsii, Kiev, Ukrainian SSR) Kibernetika i Vychislitel'naia Tekhnika (ISSN 0454-9910), no. 55, 1982, p 34-37 In Russian. refs

The method outlined here separates the pilots into two groups. The classification is based on the mobility of nerve processes, which is determined by indicators characterizing the speed with which information is used. In the procedure, a word designating a plant, an animal, or an inanimate object is flashed on the screen. The pilot classifies the word by pressing a button in his right or left hand to indicate, respectively, a plant or an animal and by pressing both buttons to indicate an inanimate object. The words, 50 in each group, are flashed at a rate of 40 words per minute at the beginning of the experiment, and the rate is gradually increased. The test involves between 3 and 7 word groups. C.R.

A83-33323
A COMPREHENSIVE EVALUATION OF THE PROBABILITY OF THE ASTHENIZATION OF FEMALE WORKERS IN CONDITIONS OF NERVOUS STRESS (USING THE MODEL OF TELEPHONE OPERATORS ON INTERURBAN LINES) [KOMPLEKSNAIA OTSENKA VEROIATNOSTI ASTENIZATSII RABOTNITS NERVNO-NAPRIAZHENNOGO TRUDA /NA MODELI TELEFONISTOK-MEZHDUGORODNITS/]
N. V. DOGLE and T P. IAKOVLEVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Nov 1982, p. 16-19. In Russian.

N83-24172 Royal Aircraft Establishment, Farnborough (England).
THE OPTICAL DETECTION OF AIR TARGETS AND ITS DEPENDENCE ON ENVIRONMENTAL, TARGET AND OBSERVATIONAL PARAMETERS FOR GROUND-TO-AIR AND AIR-TO-AIR OBSERVATIONS
H. E. HOFFMANN Sep. 1982 28 p refs Transl. into ENGLISH of "Die optische efassung von luftzielen in abhaengigkeit von umgebungs-, ziel, und beobachtungsparametern bei beobachtungen boden-luft BZW luft-luft" rept. BMVg-FBWT-81-12, West Germany
(RAE-TRANS-2097; BR87704) Avail. Issuing Activity

A series of outdoor tests on the visibility of aircraft was undertaken in co-operation with the Bundeswehr. The main purpose of the program was to determine the effects of various environmental, target and observation parameters on their maximum detection and recognition ranges. The environmental parameters considered were the degree of turbidity of the atmosphere, the background, direction of observation, aircraft height and brightness, the target parameters were their size and color and observations were made with the naked eye and binoculars The standard target aircraft used during the tests was a DO27 painted dark green. Although the observations were made from the ground, the results can be used to give air-to-air observation range if required Author

N83-24173*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif
A LOOK AT MOTION IN THE FREQUENCY DOMAIN
A B. WATSON and A J. AHUMADA, JR. Apr. 1983 13 p refs
(NASA-TM-84352; A-9304, NAS 1.15:84352) Avail. NTIS HC A02/MF A01 CSCL 05I

A moving image can be specified by a contrast distribution, c(x,y,t), over the dimensions of space x,y, and time t. Alternatively, it can be specified by the distribution C(u,v,w) over spatial frequency u,v and temporal frequency w The frequency representation of a moving image is shown to have a characteristic form. This permits two useful observations. The first is that the apparent smoothness of time-sampled moving images (apparent motion) can be explained by the filtering action of the human visual system This leads to the following formula for the required update rate for time-sampled displays. $W(c)=W(l)+ru(l)$ where w(c) is the required update rate in Hz, W(l) is the limit of human temporal resolution in Hz, r is the velocity of the moving image in degrees/sec, and u(l) is the limit of human spatial resolution in cycles/deg. The second observation is that it is possible to construct a linear sensor that responds to images moving in a particular direction The sensor is derived and its properties are discussed Author

N83-24174*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif
DETECTION AND RECOGNITION OF SIMPLE SPATIAL FORMS
A. B. WATSON Apr. 1983 18 p refs
(NASA-TM-84353; A-9305; NAS 1 15:84353) Avail: NTIS HC A02/MF A01 CSCL 05I

A model of human visual sensitivity to spatial patterns is constructed. The model predicts the visibility and discriminability of arbitrary two-dimensional monochrome images. The image is analyzed by a large array of linear feature sensors, which differ in spatial frequency, phase, orientation, and position in the visual field. All sensors have one octave frequency bandwidths, and increase in size linearly with eccentricity. Sensor responses are processed by an ideal Bayesian classifier, subject to uncertainty. The performance of the model is compared to that of the human observer in detecting and discriminating some simple images Author

N83-24175# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
A MODEL OF THE HUMAN DECISION MAKER OBSERVING A DYNAMIC SYSTEM
P. H. WEWERINKE 31 Mar. 1981 65 p refs
(Contract NIVR-1857)
(NLR-TR-81062-U) Avail NTIS HC A04/MF A01

A model of the human observer and decision maker is described. A submodel of the human observer is formulated in linear estimation theoretical terms including the perception of the displayed information of a linear process and the central information processing stage. The subsequent decision process is described in sequential decision theory by considering the hypothesis that an abnormal condition occurred by a generalized likelihood ratio test. On the basis of only two model parameters the model predicts the decision speed/accuracy trade off and various attentional characteristics. A variety of multivariable failure detection tasks was investigated. The predictive capability of the model is shown and in the specific effect of almost all task variables is accurately predicted by the model. E.A.K

N83-24176# National Aerospace Lab , Amsterdam (Netherlands). Flight Div.
AN EXPERIMENTAL ANALYSIS OF HUMAN MONITORING BEHAVIOR IN MULTIVARIABLE FAILURE DETECTION TASKS
R C. VANDEGRAAFF 29 Jul 1982 78 p refs
(Contract NIVR-1857)
(NLR-TR-81063-U) Avail: NTIS HC A05/MF A01

An experimental program which was designed to validate a model of the human observer and decision maker formulated in terms of linear estimation and classical sequential is discussed. The subjects had to detect and diagnose the occurrence of ramp failures which were superimposed upon zero mean stochastic Gaussian processes. The independent variables were signal handwidth, number of displays, correlation among displays, failure magnitude, failure type, and prior knowledge about failure type. The dependent variables were detection times, display deviations at the moments of response and false alarm rates. Heart rate, skin resistance and eye point of regard were measured The display deviations which indicate a constant detection strategy are analyzed In addition, the eye point of regard measurements rendered a useful insight into certain scanning characteristics The physiological measures are sensitive only to the number of displays involved, and prior knowledge about failure type E.A K.

N83-24177# Air Force Inst of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics
PREDICTIVE MEASURES FOR THE ACHIEVEMENT OF TRAINING SUCCESS IN AIR FORCE TECHNICAL TRAINING M.S. Thesis
T M. NEWSTAD and J. A. SCHUSTER Sep 1982 72 p refs
(AD-A123005; AFIT-LSSR-37-82) Avail: NTIS HC A04/MF A01 CSCL 05I

This research was conducted to investigate the predictive nature of a variety of measures for the achievement of training success at the Air Force Technical Training School, Chanute Air Force Base, Illinois. A sample of 1358 male and female airmen attending 12 technical training courses from 1 July 1981 to 15 February 1982 was analyzed using multiple regression analysis. Final course grade served as the criterion of training success. Predictor variables included four aptitude indices and one intelligence score from the Armed Services Vocational Aptitude Battery (ASVAB), seven biographical items, and four on-site instructional variables.
Author (GRA)

N83-24178# Air Force Inst of Tech., Wright-Patterson AFB, Ohio School of Systems and Logistics.
A MODEL AND FIELD TEST OF THE RELATIONSHIPS BETWEEN TASK CHARACTERISTICS, TASK ENVIRONMENT, INTRINSIC AND EXTRINSIC JOB SATISFACTION, JOB STRESS AND SELF-REPORTED JOB PERFORMANCE M.S. Thesis
N. E. ADAMS and L. S HARRIS Sep. 1982 98 p refs
(AD-A123006, AFIT-LSSR-90-82) Avail NTIS HC A05/MF A01 CSCL 05I

This thesis reviews the literature in the areas of job satisfaction, job stress, and self-rated job performance. Controversy has raged over the relationship between satisfaction and work outcomes - particularly job performance. This research attempts to develop a model of some of the more prominent variables that effect worker perceived productivity The model hypothesizes that task characteristics effect intrinsic job satisfaction, task environment factors effect extrinsic job satisfaction, job satisfaction effects job stress, and job stress effects self-perceived productivity Research data was collected at a large Department of Defense medical center, verified for reliability, and tested for correlation of the variables via the Pearson correlation and multiple regression statistical techniques. The research results indicated that all the model relationships were as hypothesized. Author (GRA)

N83-25369# Pittsburgh Univ, Pa Learning Research and Development Center.
SIMULATION SYSTEMS FOR COGNITIVE PSYCHOLOGY
R. NECHES Aug 1982 67 p refs
(Contract N0014-79-C-0215, NR PROJ 667-430)
(AD-A123394; UPITT/LRDC/ONR/APS-12) Avail. NTIS HC A04/MF A01 CSCL 05J

Three views of the function of computer simulation in cognitive psychology are analyzed. The strong view that computer simulations will produce more rigorously specified theories is seen to be overstating the case Two more pragmatic views are supported. One looks at computer method as a means of exploring or validating psychological theories. The other looks to computer simulation as a source of useful concepts Several simulation efforts are presented as illustrations of these latter views. After establishing some perspective on the uses of simulation, the discussion turns to psychological simulation languages, and to aspects of programming environments which facilitate simulation work A new simulation language, PRISM, is described. GRA

N83-25370# Cornell Univ, Ithaca, N. Y. Dept. of Education
THE PERCEPTION OF OBJECTS AND THEIR FUNCTIONAL USES Technical Report, 31 May - 30 Nov. 1982
M KNOWLTON, F. KEIL, and M D GLOCK Nov 1982 47 p refs
(Contract N00014-80-C-0372, NR PROJ. 157-452; RR0420602)
(AD-A122797, TR-9-SER-B; TR-8) Avail: NTIS HC A03/MF A01 CSCL 06P

Five common objects were selected to which multiple uses could be assigned The eye scanning patterns of 43 subjects were examined as they made decisions regarding possible functional uses of these objects We hypothesized that special features of objects must be attended to before such decisions can be made. The stimuli were line drawings of the objects with specific feature areas delineated Each object was shown in four orientations selected by rotating the object in the picture plane by 90 degree increments. Correlations were computed between the fixations in each of the feature areas and canonical and functional scales developed by independent introspective ratings Significant correlations occurred with specific areas of familiar objects and the canonical scales. One unfamiliar object had significant correlations with the functional scales for that object Therefore, subjects did rely on specific features to identify the objects and apparently used the features to retrieve a semantic label from which they made inferences about functional information.
Author (GRA)

N83-25371# Naval Postgraduate School, Monterey, Calif.
PILOT SELECTION CRITERIA FOR THE AH-64 HELICOPTER M.S. thesis
R. DIAMOND Dec. 1982 72 p refs
(AD-A122495) Avail: NTIS HC A05/MF A01 CSCL 05I

This thesis uses statistical analysis methods and subjective decisions to determine the parameters necessary to establish crew selection criteria for the AH-64 attack helicopter The purpose of establishing these parameters is to aid the Army in establishing pilot selection criteria for the AH-64. The techniques of simple linear regresssion and nonparametric statistics indicated that the greater the experience level the better performance level achieved. The analysis of crews determined that less experienced crews performed proportionately as well as the more experienced crews. Curiously, the amount of experience of the pilot is not a determining factor, whereas the copilot gunners experience is directly related to how well the crew performed. Crew selection for the AH-64 helicopter should be made from the existing AH-1 series community of aviators with the more experienced aviators performing duties as copilot gunner GRA

54

MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering, biotechnology; and space suits and protective clothing

A83-30154
HUMANSCALE 7/8/9
N DIFFRIENT, A. R TILLEY, and D. HARMAN Research supported by the National Endowment for the Arts and Humanities. Cambridge, MA, MIT Press, 1981, 58 p. refs

Humanscale 7/8/9, a portfolio of information about aspects of human factors engineering, includes three selectors and a manual A selector consists of two plastic layers with a rotary dial between them; both sides can be made to call up thousands of bits of information without resorting to research in books, reference sources, and codes. Section 7 (Standing and Sitting at Work) deals with such topics as reach and strength, space envelopes, mockups, and common sense human engineering. Section 8 (Space Planning for the Individual and the Public) deals with both private and public space. Section 9 (Access for Maintenance, Stairs, Light and Color) includes discussions of recommended illumination, reflectances, and contrast ratio. B J

A83-30155
HUMANSCALE 4/5/6
N. DIFFRIENT, A. R. TILLEY, and D. HARMAN Research supported by the National Endowment for the Arts and Humanities Cambridge, MA, MIT Press, 1981, 55 p. refs

Humanscale 4/5/6 is a tool that can be used to design equipment for maximum operator efficiency, comfort, and safety. It includes three selectors and a manual; a selector consists of two plastic layers with a rotary dial sandwiched between them; both sides can be made to call up thousands of bits of information without resorting to research in books, reference sources, and codes Section 4 (Human strength and safety) deals with such topics as safe weight lifting and body strength; energy expenditure for various occupations; noise, sound, and acoustics; safe temperatures, chemical and radiation hazards, and vibration and motion hazards. Section 5 (Controls and Displays) deals with hand and finger controls, foot controls, visual displays, control panels, and sound signals. Section 6 (Designing for People) deals with anthropometry, percentiles, pivot points and links, vision and other senses, and human performance B.J.

A83-30306
THE METROLOGICAL POSSIBILITIES OF THE TETRAPOLAR TRANSTHORACIC IMPEDANCE RHEOPLETHYSMOGRAPHY METHOD IN CLINICAL CONDITIONS [O METROLOGICHESKIKH VOZMOZHNOSTIAKH METODA TETRAPOLIARNOI TRANSTORAKAL'NOI IMPEDANSNOI REOPLETIZMOGRAFII V USLOVIIAKH KLINIKI]
M. I. GUREVICH, G. A. GRIGORASH, A I SOLOVEV, L B. DOLOMAN, and I. B. ZIMGOROD (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 29, Mar.-Apr. 1983, p. 242-245. In Russian. refs

A83-30425
MICROBIOLOGICAL PROBLEMS OF CLOSED ECOLOGICAL SYSTEMS [MIKROBIOLOGICHESKIE PROBLEMY ZAMKNUTYKH EKOLOGICHESKIKH SISTEM]
I. I GITELZON, N. S. MANUKOVSKII, I. M. PANKOVA, M. N. POSADSKAIA, L. A. SOMOVA, and L. S. TIRRANEN Novosibirsk, Izdatel'stvo Nauka, 1981, 200 p. In Russian refs

The patterns of the formation and the behavior of microflora in a closed ecological system which can support human life is studied during experiments of various lengths The microflora of the intrasystem space and the separate links of the system are examined, including man, the link of the biological regeneration of the atmosphere and water (which is essential for the life processes of the lower photoflora in combination with bacteria), the link of the higher photoflora, and the link of the microbiological mineralization of wastes Also considered are the human autoflora in life-sustaining systems and the exchange of microflora between the links of the biological systems. N B.

A83-30618
ROBOT SYSTEMS AS HIGHER FORMS OF TOOLS FOR THE AUTOMATION OF INVESTIGATIONS IN EXTREME ENVIRONMENTS [ROBOTOTEKHNICHESKIE KOMPLEKSY KAK VYSSHAIA FORMA SREDSTV AVTOMATIZATSII ISSLEDOVANII V EKSTREMAL'NYKH SREDAKH]
A. E. BOR-RAMENSKII IN. Computational systems and methods in the automation of investigations and control . Moscow, Izdatel'stvo Nauka, 1982, p. 134-140. In Russian.

The basic problems in the design of robot systems for investigations in extreme environments are reviewed, with reference to work done in the ocean (e.g., on the ocean bottom). These problems include the development of video communication channels, the development of energy sources (especially nuclear ones), and the development of systems of motion control Design solutions to some of these problems are suggested. B J.

A83-30619
SYSTEM FOR THE COMPUTER-AIDED DESIGN OF ROBOT DEVICES [SISTEMA AVTOMATIZATSII PROEKTIROVANIIA ROBOTOTEKHNICHESKIKH USTROISTV]
F. M. KULAKOV IN: Computational systems and methods in the automation of investigations and control Moscow, Izdatel'stvo Nauka, 1982, p. 148-156. In Russian.

A computer-aided design system is described which makes it possible to automate the initial research stages of robot design. Attention is given to design results achieved with a high-performance circuit control system and with an adapative control system that employs force information. B J

A83-30927* Carleton Controls Corp., East Aurora, N.Y
SHUTTLE ORBITER ATMOSPHERIC REVITALIZATION PRESSURE CONTROL SUBSYSTEM
J. J. WALLESHAUSER, G. R. ORD (Carleton Controls Corp., East Aurora, NY), and R. N PRINCE (NASA, Johnson Space Center, Houston, TX) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 11 p.
(SAE PAPER 820882)

The Atmospheric Revitalization Pressure Control Subsystem (ARPCS) provides oxygen partial pressure and total pressure control for the habitable atmosphere of the Shuttle for either a one atmosphere environment or an emergency 8 PSIA mode. It consists of a Supply Panel, Control Panel, Cabin Pressure Relief Valves and Electronic Controllers. The panels control and monitor the oxygen and nitrogen supplies. The cabin pressure relief valves protect the habitable environment from overpressurization. Electronic controllers provide proper mixing of the two gases. This paper describes the ARPCS, addresses the changes in hardware that have occurred since the inception of the program, the performance of this subsystem during STS-1 and STS-2; and discusses future operation modes. Author

A83-30933
THERMAL CONTROL SYSTEM FOR A MANNED SPACE STATION
R. J. CUSHMAN (United Technologies Corp., Hamilton Stanford Div., Windsor Locks, CT) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 9 p. refs
(SAE PAPER 820836)

This paper describes the thermal control system designed to provide environmental and equipment cooling for a Manned Space Station Ventilation flow patterns have been selected which maintain a comfortable shirt sleeve environment in zero gravity while providing contaminant process flow, as well as the versatility of providing both distributed and localized equipment cooling The paper also describes process flow systems and equipment required to remove thermal, humidify, and contaminant loads. How the equipment interfaces with a liquid cooling loop system is detailed, including how thermoelectric heat pumps were included for use during degraded operations Author

A83-30934
SPACE STATION CREW OPERATIONS IMPACT ON ECLSS DESIGN
W. G NELSON and H. B KELLY (McDonnell Douglas Astronautics Co , Huntington Beach, CA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 10 p.
(SAE PAPER 820839)

NASA and the Air Force are currently considering Space Station concepts which feature a wide variety of manned activities including payload operations, command and control, large system deployment, geo-vehicle buildup, and spacecraft servicing and launch. This paper identifies potential mission operations and objectives for these concepts and defines the related crew tasks. Relationships are presented between crew and station operational capabilities. An Environmental Control Life Support Subsystem (ECLSS) is defined and design impacts are identified for each mission type. Crew requirements are synthesized and ECLSS characteristics are presented for each mission type. Author

A83-30937* Life Systems, Inc., Cleveland, Ohio
AN INTEGRATED REGENERATIVE AIR REVITALIZATION SYSTEM FOR SPACECRAFT
G. P. NOYES, D B. HEPPNER, F H SCHUBERT (Life Systems, Inc., Cleveland, OH), and P D. QUATTRONE (NASA, Ames Research Center, Moffett Field, CA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982 8 p. refs
(SAE PAPER 820846)

Progress towards development of an air revitalization system (ARS) for spacecraft breathable atmosphere regeneration is assessed, and a preliminary design for a one-person ARS is described The ARS is considered a necessary component of any permanently manned orbital station, and studies have demonstrated that penalties for expendable air supplies justify an ARS for missions longer than 40 days CO_2 must be removed and O_2 returned along with N_2, which can be extracted from hydrazine, with the H_2 component returning to the operation of the CO_2 reduction subsystem. An experimental ARS (ARX-1) features a cabin humidity control unit, a CO_2 concentrator, an air-cooled CO_2 reduction reactor, an oxygen generator (electrolysis), the hydrazine

N2 generator, and a water handling unit A 120-day test demonstrated one-button startup and 480 hr operation in a normal mode M S K.

A83-30938* United Technologies Corp., Windsor Locks, Conn
A REGENERABLE SOLID AMINE CO2 CONCENTRATOR FOR SPACE STATION
A M BOEHM (United Technologies Corp , Hamilton Standard Div , Windsor Locks, CT) and R. J. CUSICK (NASA, Johnson Space Center, Houston, TX) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 9 p refs
(SAE PAPER 820847)

A regenerable solid amine CO2 control system, which employs water vapor for desorption, is being developed for potential use on long duration space missions During cyclic operation, CO2 is first absorbed from the cabin atmosphere onto the granular amine. Steam is then used to heat the solid amine bed and desorb the CO2. This paper describes the solid amine system operation and application to the Shuttle Orbiter, Manned Space Platform (MSP) and Space Operations Center (SOC). The importance and interplay of system performance parameters are presented together with supporting data and design characteristics. Author

A83-30939* United Technologies Corp , Windsor Locks, Conn
THERMOELECTRIC INTEGRATED MEMBRANE EVAPORATION WATER RECOVERY TECHNOLOGY
G J ROEBELEN, JR., H E WINKLER (United Technologies Corp., Hamilton Standard Div , Windsor Locks, CT), and G. F. DEHNER (NASA, Johnson Space Center, Houston, TX) AIAA, SAE, ASME, AICHe, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 7 p
(SAE PAPER 820849)

The recently developed Thermoelectric Integrated Membrane Evaporation Subsystem (TIMES) offers a highly competitive approach to water recovery from waste fluids for future on-orbit stations such as the Space Operations Center. Low power, compactness and gravity insensitive operation are featured in this vacuum distillation subsystem that combines a hollow fiber membrane evaporator with a thermoelectric heat pump. The hollow fiber elements provide positive liquid/gas phase control with no moving parts other than pumps and an accumulator, thus solving problems inherent in other reclamation subsystem designs. In an extensive test program, over 850 hours of operation were accumulated during which time high quality product water was recovered from both urine and wash water at an average steady state production rate of 2.2 pounds per hour. Author

A83-30942* San Jose State Univ., Calif.
PLANT GROWTH AND MINERAL RECYCLE TRADE-OFFS IN DIFFERENT SCENARIOS FOR A CELSS
E. V. BALLOU, T. WYDEVEN (San Jose State University, San Jose, CA), and L. A SPITZE (NASA, Ames Research Center, Moffett Field, CA) AIAA, SAE, ASME, AICHE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 7 p. 14.
(SAE PAPER 820855)

Data for hydroponic plant growth in a manned system test is combined with nutritional recommendations to suport trade-off calculations for closed and partially closed life support system scenarios Published data are used as guidelines for the masses of mineral nutrients needed for higher plant production. The results of calculations based on various scenarios are presented for various combinations of plant growth chamber utilization and fraction of mineral recycle Estimates are made of the masses of material needed to meet human nutritional requirements in the various scenarios. It appears that food production from a plant growth chamber with mineral recycle is favorable to reduction of the total launch weight in missions exceeding 3 years Author

A83-30943
CLOSED MICROBIAL ECOSYSTEMS AS GAS EXCHANGE UNITS IN CELSS
E. A KEANS and C. E FOLSOME (Hawaii, University, Honolulu, HI) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 4 p. refs
(SAE PAPER 820857)

Materially closed, energetically open, natural microbial ecosystems, were constructed in flasks and sealed under ambient air These systems were used to study ecosystem stability, defined as resistance to departure from light energy-driven coupled bioelemental cycling Since it is closely associated with terrestrial ecology, oxygen concentration was chosen to measure the states of the closed microecosystems. Results indicate that rates of change in PO2 are indicators of the states of closed complex natural microsystems Such systems endure indefinitely and reach oxygen concentrations greater than normal atmospheric PO2 In addition, a light energy isolated system yielded an oxygen consumption rate which was used to calculate the apparent quantum energy efficiency, Q. The calculated value, 1.3 percent, compares favorably with the Q of most terrestrial ecosystems These studies contribute to general ecosystem analysis and indicate that complex microbial ecosystems could be used as gas exchange mechanisms in closed life support systems. Author

A83-30945* Modar, Inc , Natick, Mass.
SUPERCRITICAL WATER OXIDATION FOR WASTEWATER TREATMENT PRELIMINARY STUDY OF UREA DESTRUCTION
S. H TIMBERLAKE, G. T. HONG, M SIMSON, and M. MODELL (Modar, Inc., Natick, MA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982 10 p refs
(Contract NSG-2403)
(SAE PAPER 820872)

Supercritical water oxidation is being investigated as a method of treating spacecraft wastewater for recycle. In this process, oxidation is conducted in an aqueous phase maintained above the critical temperature (374 C) and pressure (215 bar) of water. Organic materials are oxidized with efficiencies greater than 99.99 percent in residence times of less than 1 minute. This paper presents preliminary results for urea destruction Above 650 C, urea can be completely broken down to nitrogen gas, carbon dioxide and water by supercritical water oxidation, without the use of a specific catalyst. Author

A83-30946* San Jose State Univ , Calif.
A FLOW-SYSTEM COMPARISON OF THE REACTIVITIES OF CALCIUM SUPEROXIDE AND POTASSIUM SUPEROXIDE WITH CARBON DIOXIDE AND WATER VAPOR
P C WOOD, E. V. BALLOU, L A. SPITZE (San Jose State University, San Jose, CA), and T WYDEVEN (NASA, Ames Research Center, Moffett Field, CA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982 14 p. Research supported by the U.S Bureau of Mines refs
(SAE PAPER 820873)

A single pass flow system was used to test the reactivity of calcium superoxide with respiratory gases and the performance was compared to that of potassium superoxide The KO2 system is used by coal miners as a self-contained unit in rescue operations Particular attention was given to the reactivity with carbon dioxide and water vapor at different temperatures and partial pressures of oxygen, carbon dioxide, and water vapor. The calcium superoxide beds were found to absorb CO2 and H2O vapor, releasing O2. The KO2 bed, however, released O2 at twice the rate of CO2 absorption at 37 C. It is concluded that the calcium superoxide material is not a suitable replacement for the KO2 bed, although Ca(O2)2 may be added to the KO2 bed to enhance the CO2 absorption. M.S.K.

A83-30947
CO2 CONCENTRATION USING A MOLTEN CARBONATE ELECTROCHEMICAL CELL
J. WEAVER and J. WINNICK (Georgia Institute of Technology, Atlanta, GA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982. 26 p. refs
(SAE PAPER 820874)

A molten carbonate fuel cell has been successfully tested as a carbon dioxide concentrator Cathode performance is examined in terms of removal efficiency, voltage loss and current efficiency at oxidant CO2 levels typical of manned space cabin atmospheres. A system design based on this concept has the potential advantages of small size, low component cost and high current efficiency at low-CO2 levels. The disadvantages arrive from the penalties associated with the high-temperature operation. Author

A83-30972#
AN ENGINEERING CONCEPT OF ADAPTIVE CONTROL FOR MANIPULATION ROBOTS VIA PARAMETRIC SENSITIVITY ANALYSIS
M. VUKOBRATOVIC and N KIRCANSKI Academie Serbe des Sciences et des Arts, Bulletin, vol. 81, Classe des Sciences Techniques, no 20, 1982, p. 23-39 refs

A83-31069
A DYNAMIC DECISION MODEL OF HUMAN TASK SELECTION PERFORMANCE
K R PATTIPATI (Alphatech, Inc., Burlington, MA), D. L. KLEINMAN (Connecticut, University, Storrs, CT), and A R. EPHRATH (Bell Telephone Laboratories, Inc , Piscataway, NJ) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-13, Mar.-Apr. 1983, p 145-166. refs
(Contract AF-AFOSR-78-3733)

Attention is given to human information processing and task selection procedures in a dynamic multitask supervisory control environment. The results of a joint experimental and analytic program are assimilated into a normative dynamic-decision model for predicting human task-selection performance. With this in view, a general multitask experimental paradigm is developed wherein tasks of different value, time requirement, and deadline compete for a person's attention. Using this framework, the effects of various task related variables on human-decision processes are studied empirically To validate the model via comparison with experimental results, several time history and scalar measures of performance similarity are proposed. Excellent model-data agreement for all the experimental conditions is obtained In addition, the model is shown to perform significantly better than various heuristic sequencing rules of scheduling theory that neglect the inherent human information processing and decisionmaking limitations.
C.R.

A83-31075* Ohio State Univ., Columbus.
REVIEW OF PSEUDOINVERSE CONTROL FOR USE WITH KINEMATICALLY REDUNDANT MANIPULATORS
C. A. KLEIN (Ohio State University, Columbus, OH) and C.-H. HUANG (General Automation, Anaheim, CA) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-13, Mar.-Apr. 1983, p. 245-250. refs
(Contract NSF ECS-78-18957; NAG1-30)

Kinematically redundant manipulators have a number of potential advantages over current manipulator designs. For this type of arm, velocity control through pseudoinverses has been suggested. Questions associated with pseudoinverse control are examined in detail and show that in some cases this control leads to undesired arm configurations. A method for distributing joint angles of a redundant arm in a good approximation to a true minimax criterion is described. In addition several numerical considerations are discussed. Author

A83-31396
NONLINER WALKING AND RUNNING OF A BIPED WALKING MACHINE [NELINEINAIA KHOD'BA I BEG DVUNOGOGO SHAGAIUSHCHEGO APPARATA]
O. B. BUZUR-OOL Moskovskii Universitet, Vestnik, Seriia 1 - Matematika, Mekhanika (ISSN 0579-9368), Mar.-Apr. 1983, p. 70-74. In Russian.

A83-32457
THE CURRENT TECHNIQUE FOR RADAR CONTROL ROOM LIGHTING OF THE FRENCH AIR FORCE [APPROCHE ACTUELLE DE L'ECLAIRAGE DES SALLES DE CONTROLE RADAR DE L'ARMEE DE L'AIR]
J. P. MENU, D. BATEJAT, and G. SANTUCCI (Centre d'Etudes et de Recherches de Medecine Aerospatiale, Laboratoire Central de Biologie Aerospatiale, Paris, France) Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p. 38-41. In French. refs

The results of trials to determine the best lighting conditions for ATC personnel of the French Air Force are reported. The study quantified the levels of visual stimuli reaching the eyes of the controllers and also evaluated the subjective visual comfort reported by the controllers in each ambient luminous level. Varying levels of total illumination were examined and analyzed in parallel with questionnaires filled out by the controllers. The questions covered both the response and working comfort at different lighting levels and the aesthetic preferences of the controllers Incandescent lights were preferred to fluorescent lights Brightness was limited by the presence of reflections on the radar screens A homogeneity of the lighting conditions is shown to be essential, as is desaturation of the wall paint color tones. Black and brilliant wall colors were completely unacceptable M S.K

A83-32458
THE IMPORTANCE OF CABIN GUIDE MARKS IN VISUAL FLYING APPLICATION OF THIS IDEA TO THE DESIGN OF NIGHT VISION AIDES, OF THE VISUAL HELMET TYPE [L'IMPORTANCE DES REPERES CABINES DANS LE PILOTAGE AVUE APPLICATION DE CETTE NOTIN ALA CONCEPTION DES AIDES ALA VISION NOCTURNE, TYPE 'VISUEL DE CASQUE']
J. P. PAPIN and J P. MENU (Centre d'Etudes et de Recherches de Medecine Aerospatiale, Laboratoire Central de Biologie Aerospatiale, Paris, France) Medecine Aeronqutique et Spatiale, vol. 22, 1st Quarter, 1983, p 41-44. In French.

A83-32465
GROUND AND IN-FLIGHT TESTING OF NEW PORTABLE OXYGEN GENERATORS [EVALUATION AU SOL ET EN VOL DE NOUVEAUX GENERATEURS D'OXYGENE EMBARQUABLES]
H MAROTTE and H VIEILLEFOND (Service de Santedes Armees, Paris; Centre d'Essais en Vol, Bretigny-sur-Orge, Essonne, France) (International Academy of Aviation and Space Medicine and SocieteFrancaise de Physiologie et de Medecine Aeronautiques et Cosmonautiques, Congres International du Medecine Aeronautique et Spatiale, 29th, Nancy, France, Sept. 7-11, 1981) Medecine Aeronqutique et Spatiale, vol 22, 1st Quarter, 1983, p. 99-101. In French.

Portable oxygen generators equipped with molecular sieves for producing oxygen-enriched air for aircraft cabins in-flight are described, along with the results of flight tests and ground service trials The generator works off the power produced by the jet engines. The cabin air is passed through zeolite filters after pressurization to clear the air of gases other than oxygen; a second filter is used with the intake of external air. Ground tests have been performed to assay the effects of varying the pressures at each of the two zeolite tubes, mainly in terms of the interior cabin pressure relative to the exterior atmosphere at different altitudes. Flight tests showed that the oxygen enrichment achieved on the ground can be established in-flight, i e , 90 percent O2 for the interior generator and 70 percent at the external intake. However, it was also determined that the generator does not perform well during descent of the aircraft, a factor that is overshadowed by its otherwise satisfactory functioning. M.S.K.

A83-32467
THE INFLUENCE OF WATERPROOFING FAILURE ON THE THERMAL INSULATION OF SEALED FLIGHTSUITS USED IN MILITARY AVIATION [INFLUENCE D'UN DEFAUT D'ETANCHEITESUR L'ISOLEMENT THERMIQUE DES EQUIPEMENTS ETANCHES UTILISES EN AERONAUTIQUE MILITAIRE]
C. BOUTELIER, M. LONCLE, A. LEGER, and J. L POIRIER (Centre d'Essais en vol, Bretigny-sur-Orge, Essonne, France) (International Academy of Aviation and Space Medicine and SocieteFrancaise de Physiologie et de Medecine Aeronautiques et Cosmonautiques, Congres International du Medecine Aeronautique et Spatiale, 29th, Nancy, France, Sept 7-11, 1981) Medecine Aeronautique et Spatiale, vol. 22, 1st Quarter, 1983, p. 104-106. In French refs

Three male subjects of differing physical morphologies participated in experimental trials designed to determine the loss of thermal insulation incurred by pilots entering water wearing flightsuits with leaks and the concommitant physiological responses. The subjects wore bathing trunks, flight boots sealed to a warm undergarment, and flotation vests. Tubes inserted into the clothes permitted the introduction of water at the lumbar and posterior lower extremities regions. The leaks simulate situations of rupture of the protective integrity of the suits. Water temperatures of 4, 6, and 9 C were used, with immersions of 90 minutes Controlled trials were also run with no water allowed into the suits Thermal losses through the skin were monitored. Significant deteriorations in tolerance were observed when leaks were introduced, indicating a necessity for periodic inspection of the seals on flight suits. M.S.K

A83-32571
AN ELECTRONIC MODEL OF THE CONDITIONED REFLEX [ELEKTRONNAIA MODEL' USLOVNOGO REFLEKSA]
A. S BOGOMAZ and E. E KRISTMAN Priborostroenie (Kiev) (ISSN 0130-853X), no. 32, 1982, p. 74-79. In Russian refs

An electronic model of the conditioned reflex is developed which contains a diffused integrating chemotronic tetrode as the unit of long-term memory. It is shown that the use of this tetrode allows the inhibitory and excitation regimes to be realized in a sufficiently simple manner, as well as the reconstruction of the model. The design relationships used for selecting the type of tetrode model are presented N.B.

A83-32693
QUANTITATIVE ELECTROMYOGRAPHY - RESPONSE OF THE NECK MUSCLES TO CONVENTIONAL HELMET LOADING
C. A. PHILLIPS and J. S. PETROFSKY (Wright State University, Dayton, OH) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, May 1983, p 452-457 refs
(Contract DAMD17-80-C-0089)

A helmet dynamometer was employed to test the accuracy of an electromyogram (EMG) for detecting the onset of fatigue of the neck muscles when maximal voluntary contraction trials were performed while wearing an Army helmet. Five subject participated, with EMG monitoring at the trapezius, splenius, and the sternocleiodomastoid muscles. The subjects performed maximal voluntary contraction exercises by tilting their heads forward, backward, and side-to-side. Peak to peak voltage amplitudes were measured. Characteristic alteractions in the EMG amplitudes were well-correlatead with the isometric muscle fatigue. It is concluded that EMG monitoring provides an accurate, noninvasive means of assaying the presence of neck muscle fatigue. M.S.K.

A83-32694* Kentucky Univ., Lexington
TRANSDUCERS FOR ULTRASONIC LIMB PLETHYSMOGRAPHY
W. T. NICKELL, V. C. WU, and P. K BHAGAT (Kentucky, University, Lexington, KY) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol 54, May 1983, p 458-463 refs
(Contract NAS9-15452; N00014-K-0325)

The design, construction, and performance characteristics of ultasonic transducers suitable for limb plethysmography are presented. Both 3-mm-diameter flat-plate and 12-mm-diameter hemispheric ceramic transducers operating at 2 MHz were fitted in 1-mm thick epoxy-resin lens/acoustic-coupling structures and mounted in exercie-EKG electrode housings for placement on the calf using adhesive collars. The effects of transducer directional characteristics on performance under off-axis rotation and the electrical impedances of the transducers were measured The flat transducer was found to be sensitive to rotation and have an impedance of 800 ohms; the hemispheric transducer, to be unaffected by rotation and have an impedance of 80 ohms. The use of hemispheric transducers as both transmitter and receiver, or of a flat transducer as transmitter and a hemispheric transducer as receiver, was found to produce adequate dimensional measurements, with minimum care in transducer placement, in short-term physiological experiments and long-term (up to 7-day) attachment tests T.K

A83-32799
ON THE POSSIBILITY TO DETERMINE INTEGRAL CHARACTERISTICS OF THE CARDIAC ELECTRIC GENERATOR FROM EXTRACARDIAC ELECTRIC AND MAGNETIC MEASUREMENTS
L. I TITOMIR (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR) and P KNEPPO (Slovak Academy of Sciences, Institute of Measurement, Bratislava, Czechoslovakia) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-30, April 1983, p. 222-226. refs

Consideration is given to the relation between the electric and magnetic fields of the heart outside the body, under the assumption that the membrane currents affected by the primary bioelectric generators may be geometrically represented by curvilinear, thread-like flows The present approach, which has its basis in the multipole expansion of scalar potentials, is developed in order to distinguish between two parts of the total magnetic field measured. The first part of the field is uniquely joined with the electric field, while the second is independent and contains information concerning the curvilinearity of the elementary generators O C.

A83-32819
CALORIMETRY WITH HEAT FLUX TRANSDUCERS - COMPARISON WITH A SUIT CALORIMETER
R. P LAYTON, W H. MINTS, JR., J. F ANNIS, M. J. RACK, and P. WEBB (National Naval Medical Center, Naval Medical Research Institute, Bethesda, MD, Webb Associates, Yellow Springs, OH) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol 54, May 1983, p. 1361-1367. Navy-supported research refs

Regional and total body heat loss rates of human subjects at rest were measured simultaneously by means of an array of heat flux transducers and with a tube suit calorimeter Conditions ranged from thermal comfort to strong cooling. A high degree of correlation was found between heat loss rates determined by the two independent techniques. For the head and arms, the transducer array system measured less heat loss than the suit. For the torso and legs, measurements by the two methods were equivalent. For the whole body, the transducer system yielded a heat loss rate 87 percent of the suit calorimeter value. Author

A83-32953
THE EVALUATION OF THE PSYCHOPHYSIOLOGICAL CONDITION OF A HUMAN OPERATOR IN REAL TIME [K OTSENKE PSIKHOFIZIOLOGICHESKOGO SOSTOIANIIA CHELOVEKA-OPERATORA V REAL'NOM VREMENI]
V. I. ADASOVSKII (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) Kibernetika i Vychislitel'naia Tekhnika (ISSN 0454-9910), no 55, 1982, p 26-29 In Russian.

The problem of designing an automated system for the collection and transmission of data about the psychological and physiological condition of a human operator in a controlled system is examined. A method is then presented for the identification of parameters which characterize the human operator and for the calculation of the integral parameter of the condition of the operator in real time. N.B.

A83-32954
THE IDENTIFICATION OF SUBJECTIVE EVALUATIONS OF THE INTERACTION OF A HUMAN OPERATOR AND TECHNICAL FACILITIES [IDENTIFIKATSIIA SUB'EKTIVNYKH OTSENOK VZAIMODEISTVIIA CHELOVEKA-OPERATORA I TEKHNICHESKIKH SREDSTV]
V. A. CHERNOMORETS and V. S. KHOMINICH (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) Kibernetika i Vychislitel'naia Tekhnika (ISSN 0454-9910), no. 55, 1982, p. 29-34. In Russian. refs

A technique for constructing the parameter regions of a mathematical model of operator activity in an ergatic system of control is presented. The approach is illustrated by the example of the activity of an operator in the process of compensatory tracking. This activity is part of a class called 'preferred control', which is characterized by the presence of a definite relationship between the expenditure of physical strength for the completion of the reaction and the expected results of this activity. The results of the empirical and standard control processes show that the adequacy of the corresponding parameters of the conceptual models of the activity of their real prototypes can be evaluated. N.B.

A83-32956
A LINEAR MODEL OF THE GENERAL COORDINATES OF THE FUNCTIONAL CONDITION OF A HUMAN OPERATOR, AND THEIR CALCULATION AND INTERPRETATION [LINEINAIA MODEL' OBOBSHCHENNYKH KOORDINAT FUNKTSIONAL'NOGO SOSTOIANIIA CHELOVEKA-OPERATORA, IKH VYCHISLENIE I INTERPRETATSIIA]
IU. V PARAMONOV and N E AFANASENKO (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) Kibernetika i Vychislitel'naia Tekhnika (ISSN 0454-9910), no 55, 1982, p 41-46 In Russian. refs

A method is developed for evaluating the functional condition of an operator, based on the analysis of the structure of the paired connections between various physiological indicators This method is distinct from the commonly used empirical method of the relationship of psychophysiological parameters with the functional condition of an operator Results show that this method can provide information about the presence of compensatory changes of individual physiological indicators, linked with increasing stress. This model for the evaluation of general characteristics of the physiological condition of a human allows an objective evaluation of the contribution of each initial variable. N B

A83-32958
A METHOD FOR THE CALCULATION OF THE SPATIAL POSITION OF THE DIPOLE GENERATORS OF MULTIDIPOLE MODEL OF THE EQUIVALENT GENERATOR OF THE HEART [METOD RASCHETA PROSTRANSTVENNOGO POLOZHENIIA DIPOL'NYKH GENERATOROV MUL'TIDIPOL'NOI MODELI EKVIVALENTNOGO GENERATORA SERDTSA]
E M. MASLOVA (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) Kibernetika i Vychislitel'naia Tekhnika (ISSN 0454-9910), no. 55, 1982, p. 83-87. In Russian refs

A83-33108* Bell Telephone Labs., Inc., Holmdel, N. J.
DESIGN CONSIDERATIONS FOR A REAL-TIME OCULAR COUNTERROLL INSTRUMENT
M. HATAMIAN (Bell Telephone Laboratories, Inc, Holmdel, NJ) and D J. ANDERSON (Michigan, University, Ann Arbor, MI) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-30, May 1983, p. 278-288. refs
(Contract NAS9-15244; NIH-NS-05785)

A real-time algorithm for measuring three-dimensional movement of the human eye, especially torsional movement, is presented. As its input, the system uses images of the eyeball taken at video rate. The amount of horizontal and vertical movement is extracted using a pupil tracking technique. The torsional movement is then measured by computing the discrete cross-correlation function between the circular samples of successive images of the iris patterns and searching for the position of the peak of the function. A local least square interpolation around the peak of the cross-correlation function is used to produce nearly unbiased estimates of torsion angle with accuracy of about 3-4 arcmin. Accuracies of better than 0 03 deg are achievable in *torsional measurement with SNR higher than 36 dB. Horizontal* and vertical rotations of up to + or - 13 deg can occur simultaneously with torsion without introducing any appreciable error in the counterrolling measurement process. C.D.

A83-33312
THE FORMALIZATION OF THE CHOICE OF THE ACOUSTIC STIMULUS PARAMETERS IN A SMALL AUTOMATIC DEVICE FOR THE EXAMINATION AND DIAGNOSIS OF THE FUNCTIONAL CONDITION OF THE AUDITORY ANALYZER [FORMALIZATSIIA VYBORA PARAMETROV AKUSTICHESKOGO STIMULA MALOGO AVTOMATIZIROVANNOGO KOMPLEKSA DLIA OBSLEDOVANIIA I DIAGNOSTIKI FUNKTSIONAL'NOGO SOSTOIANIIA SLUKHOVOGO ANALIZATORA]
E I. PODGORNYI and E. A. BAKAI (Kievskii Nauchno-Issledovatel'skii Institut Otolaringologii, Kiev, Ukrainian) Meditsinskaia Tekhnika (ISSN 0047-6617), Nov.-Dec 1982, p 10-14. In Russian. refs

A83-33313
A BONE TELEPHONE FOR MEASURING THE AUDIBLE THRESHOLD IN AN EXTENDED RANGE OF FREQUENCIES [KOSTNYI TELEFON DLIA IZMERENIIA POROGOV *SLYSHIMOSTI V RASSHIRENNOM DIAPAZONE CHASTOT*]
B. M SAGALOVICH and F. V BEDNIN (Ministerstvo Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Gorla i Nosa, Moscow, USSR) Meditsinskaia Tekhnika (ISSN 0047-6617), Nov.-Dec. 1982, p 14-18. In Russian refs

A piezoelectric bone telephone is developed for determining audible thresholds while sound is conducted through the bone over an expanded frequency range of 0.25-20 kHz It is shown that electromagnetic bone telephones can measure audible frequencies only up to 6 K kHz, while the piezoelectric transducer equivalent circuit can measure frequencies up to 20 kHz A model of a piezoelectric bone telephone, conforming to IEC recommendations, is presented and some experimental results obtained with this model device for the frequency range of 0.25-20 kHz are given. N B

A83-33314
OPTIMAL CONDITIONS FOR PROTECTING THE EYES FROM SOLAR RADIATION WITH VISION CORRECTION [OPTIMAL'NYE USLOVIIA ZASHCHITY GLAZ OT SOLNECHNYKH IZLUCHENII PRI KORREKTSII ZRENIIA]
KH. M. KAIIUMOV (Nauchno-Proizvodstvenoe Ob'edinenie Medoborudovanie, Moscow, USSR) Meditsinskaia Tekhnika (ISSN 0047-6617), Nov.-Dec. 1982, p. 39-42 In Russian.

An instrumental method is developed for determining the optimal parameters of ophthalmic lenses designed for eye protection against solar radiation. Among other results, it is found that the optimal colors of the lenses are neutral, green, yellow-green, and yellow-brown Patients aged 60 years and above need solar-protecting lenses with greater coefficients of transmission and spectral characteristics displaced toward infrared rays. In identical conditions of illumination, solar-protecting corrective lenses with negative refraction (-4 and lower) require greater and lenses with positive refraction (+4 and higher) require lesser coefficients of transmission in comparison with lenses between those values of refraction. In conditions of average illumination (20,000-30,000 lumens) lenses with a transmission coefficient of 25-50 percent are recommended. N B

A83-33324
RESULTS OF AN EXPERIMENTAL EVALUATION OF THE THERMAL STRESS OF OPERATORS [REZUL'TATY EKSPERIMENTAL'NOI OTSENKI TEPLOVOI NAGRUZKI OPERATOROV]
V. V ROMANOV (Kalininskii Politekhnicheskii Institut, Kalinin, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Nov. 1982, p. 57-59. In Russian. refs

An experimental evaluation of the thermal load of operators working in various microclimatic conditions is presented. The operators tracked radar signals continuously for 4 hr during each cycle. Results show that the thermal load can be determined by an algebraic summation of the heat production and the heat received by an organism due to convection, conduction, and radiation. The value of the thermal load in conditions of a heated microclimate can be determined with sufficient accuracy by the amount of perspiration. The amount of energy exchange of operators, which can be calculated as the difference between the heat given off due to perspiration and the heat received from the environment, is found to be 113 kcal/hr and a thermal load of about 170 kcal/hr at a temperature of 40 C. The transfer of heat by convection, conduction, and radiation in the temperature range of 25-40 C varies on the average by 11 kcal/degree-hr which corresponds to changes in the weighted mean density heat flux of 8 kcal/sq m-degree-hr. N.B.

A83-33325
A PHYSIOLOGICAL AND HYGIENIC EVALUATION OF VIBRATION IN THE CABIN OF THE MI-4 HELICOPTER [FIZIOLOGO-GIGIENICHESKAIA OTSENKA VIBRATSII V KABINE EKIPAZHA VERTOLETA MI-4]
IU N. KAMENSKII (Institut Grazhdanskoi Aviatsii, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Nov. 1982, p. 53-55 In Russian refs

The vibration in the cabin of the Mi-4 helicopter is investigated and its effects on the functional condition of pilots during routine flight are examined Results show that the vibration spectrum in the cabin of the helicopter covers a frequency range from 2-125 Hz with average values of vibration speed of 110 + or - 6 dB at a set frequency of 16 Hz. The effect of vibration on the pilots in flight is accompanied by changes in the psychophysiological indicators, and after 60-75 min of flight the pilots show signs of fatigue. During a flight shift, pilots developed pronounced fatigue after 6 hr of flight The level of vibration speed for vibration in the cabin area of the Mi-4 helicopter is recommended to be 100 dB during flights of 5 hr N.B.

N83-24179# Mannesmann Demag Foerdertechnik, Wetter (West Germany)
DEVELOPMENT AND TRIALS OF A CRANE CABIN IN THE FORM OF A MODERN, HUMAN WORKING POSITION Final Report, Dec. 1980
H. FLAIG Bonn Bundesministerium fuer Forschung und Technologie Nov. 1982 93 p refs *In* GERMAN, ENGLISH summary
(BMFT-FB-HA-82-038; ISSN-0171-7618) Avail NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19, 50

The physical conditions on a crane cabin which cause a high level of physical and mental stress which are incompatible with the crane operator's high degree of responsibility for men and materials are discussed. This reslts in a decrease in work interest and productivity and an increase the risk of accidents and damage to health. An ergonomically designed, modern standard crane cabin was developed. It is now possible to protect the operator from increased stress factors in his environment. Solving the problem of reducing vibration are emphasized. E.A.K.

N83-24180# Stuttgart Univ (West Germany). Inst fuer Steuerungstechnik der Werkzeugmaschinen und Fertigungseinrichtungen.
ROBOT CONTROL WITH SENSORY FEEDBACK Final Report, Nov. 1980
G. STUTE, H ERNE, KLEINWAECHTER (Forschungs - und Entwicklungslabor KLERA, Loerrach, West Germany), and K. H DROEGE (Forschungs - und Entwicklungslabor KERA, Loerrach, West Germany) Bonn Bundesministerium fuer Forschung und Technologie Nov. 1982 116 p refs *In* GERMAN, ENGLISH summary
(BMFT-FB-HA-82-040, ISSN-0171-7618) Avail. NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 24,50

The development of a CP-robot control system with sensory feedback to automize an industrial machining task is discussed The grinding of welding beads on car bodies by a five axis robot control system was developed to accomodate additional functions Software modules for the processing of tactile sensor data are integrated into the control system. It is shown that the CP-control with sensory feedback is able to create motion programs which optimally fit a given workpiece surface that has to be machined. It is concluded that the developed control system increases the robots' adaptivity to curved surfaces and allows for quality control during the work process. Minimal proramming is required because of algorithms for automatic pathe generation in the control. E A K.

N83-24181# Keller und Knappich, Augsburg (West Germany).
DEVELOPMENT OF A SIX-AXES INDUSTRIAL ROBOT AND TESTING OF THE COMPLETE HANDLING SYSTEM Final Report, Mar. 1980
H WOERN, N SEDLMAIR, H R. TRADT, G DUELEN (Fraunhofer Inst fuer Produktionsanlagen u. Konstruktionstech), C. P. PRAGER (Fraunhofer Inst fuer Produktionsanlagen u. Konstruktionstech), T SEIDL (Fraunhofer Inst. fuer Produktionsanlagen u Konstruktionstech.), and K. SWACZINA (Fraunhofer Inst fuer Produktionsanlagen u. Konstruktionstech) Bonn Bundesministerium fuer Forschung und Technologie Nov. 1982 106 p refs *In* GERMAN, ENGLISH summary
(BMFT-FB-HA-82-043, ISSN-0171-7618) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22

A control unit which enables a continuous path control for 6-axes industrial robots of different designs was developed The adaption of the control unit to the kinematics of a special industrial robot is planned by a suitable coordinate transformation, which is part of the software of the control unit. The control unit is technically flexible enough for use on the same robot of different sensors and drive systems A high handling and functional safety, simplicity of handling by specific handling instructions and easy adaptability to other machines and installations connected with the robot during the operational sequence are emphasized. E.A.K.

N83-24182# Watkins and Associates, Lexington, Ky.
A SECOND FIELD INVESTIGATION OF NOISE REDUCTION AFFORDED BY INSERT-TYPE HEARING PROTECTORS
R G. EDWARDS, A. B. BRODERSON, W. W. GREEN (Kentucky Univ. Medical Center), and B. L. LEMPERT (PHS) Apr 1982 67 p refs
(Contract PHS-NIOSH-210-81-3001)
(PB83-138768) Avail: NTIS HC A04/MF A01 CSCL 06Q

Field testing of noise reduction by earplugs was done. Ten factories and 280 employees took 1400 attenuation tests. User molded, expandable acoustic foam, custom molded, and acoustic wool types of earplugs were evaluated. Workers received protection ranging from about 9 decibels at 125 hertz to 29 decibels at 3150 hertz. Acoustic foam earplugs provided the best hearing protection, and acoustical wool, the least It was concluded that actual noise protection depends on earplug design. GRA

N83-25372*# GARD, Inc., Niles, Ill.
DEVELOPMENT OF A CONDENSER FOR THE DUAL CATALYST WATER RECOVERY SYSTEM
P. BUDINIKAS, F. RASOULI, and N. RABADI Mar. 1983 80 p refs
(Contract NAS2-11045)
(NASA-CR-166478; NAS 1.26:166478) Avail: NTIS HC A05/MF A01 CSCL 06K

Conceptual evaporation/condensation systems suitable for integration with the catalytic water recovery method were evaluated. The primary requirements for each concept were its capability to operate under zero-gravity conditions, condense recovered water from a vapor-noncondensable gas mixture, and integrate with the catalytic system. Specific energy requirements were estimated for concepts meeting the primary requirements, and the concept most suitable for integration with the catalytic system was proposed. A three-man rate condenser capable of integration with the proposed system, condensing water vapor in presence of noncondensables and transferring the heat of condensation to feed urine was designed, fabricated, and tested. It was treated with steam/air mixtures at atmospheric and elevated pressures and integrated with an actual catalytic water recovery system. The condenser has a condensation efficiency exceeding 90% and heat transfer rate of approximately 85% of theoretical value at coolant temperature ranging from 7 to 80 deg C Author

N83-25373# SRI International Corp , Menlo Park, Calif
MAN-MACHINE COOPERATION FOR ACTION PLANNING Final Report
A ROBINSON and D. WILKINS Nov 1982 44 p refs
(Contract N00014-80-C-0300)
(AD-A124243) Avail NTIS HC A03/MF A01 CSCL 05H

This is the final report which investigated the cooperative process that enables a computer to assist a decisionmaker in planning and scheduling sequences of actions. This involved the development of a new system for planning and scheduling actions, along with a human-engineered package for defining multimodal man-machine interfaces (i.e., interactions using different human senses) that can be readily intermingled. In addition to work on these two aspects of the general problem, we produced a demonstration system applying the techniques devised in the course of the project to a task of relevance to the Navy. As a representative application, we selected the problem of planning and monitoring aircraft movement on board a carrier. GRA

N83-25374# Center for Policy Research, Inc., New York.
ORGANIZATIONAL CONTEXT OF HUMAN FACTORS Final Report, May - Nov. 1982
C PERROW Nov. 1982 68 p refs
(Contract N00014-82-C-0436; NSF SES-80-14723)
(AD-A123435; REPT-221-2) Avail: NTIS HC A04/MF A01 CSCL 05H

Organizational structure is analyzed for the impact it has on the human factors function in military and non-military organizations. The social structure's impact upon design engineers, the social role of the operator, and on the human factors engineer is detailed. The impact of equipment upon the operator and upon the social structure is detailed. Design philosophies are contrasted. The low status and power of the human factors engineer is contrasted to the status and power of the design engineer. Top management is seen as largely responsible for the low utilization of good human factors engineering. Recommendations for alleviating this include structural changes, accountability measures, documentation, and unobtrusive changes in socialization and culture in the organization. Examples from the literature and observations are provided.
Author (GRA)

N83-25375# Systems Research Labs., Inc., Dayton, Ohio.
SUBSIDIARY RADIO COMMUNICATIONS TASKS FOR WORKLOAD ASSESSMENT IN R&D SIMULATIONS. 2: TASK SENSITIVITY EVALUATION Technical Report, 1 Jul. 1980 - 2 Jan. 1982
C. A. SHINGLEDECKER and M. S. CRABTREE Wright-Patterson AFB, Ohio Aerospace Medical Research Labs. Sep 1982 44 p refs
(Contract F33615-79-C-0503; AF PROJ. 7184)
(AD-A122545, AFAMRL-TR-82-57) Avail NTIS HC A03/MF A01 CSCL 05I

Because of the rapid growth of the technological complexity of modern aircraft and weapon systems, the assessment of operator workload at each stage of system design is of increasing importance Secondary task measures of workload sensitive, reliable indicators of how hard the operator is working One solution to these problems would be to employ secondary tasks which not only are an integral part of the operator's duties but also possess the properties of valid measurement tasks The first in a series of such studies was performed and is described in this report After extensive training on both single and dual tasks, six subjects were exposed to all possible combinations of eight communications tasks and two levels of single-axis tracking task difficulty. Dependent measures were the number of control losses on the tracking task and the accuracy and response times for the verbal and manual responses to the communication tasks Results indicate that realistic radio activities can be used as secondary tasks to provide objective measures of workload. GRA

N83-25376# UNC Nuclear Industries, Inc., Richland, Wash.
A DIGITAL IMAGE PROCESSOR AS A HUMAN FACTORS ENGINEERING TOOL
J. A. CLAYHOLD, S. A. COOK, T. P. HARRINGTON, and H TOFFER 1982 5 p Presented at the Am. Nucl Soc Topical Conf., Charleston, S. Car., 18 Mar. 1982
(Contract DE-AC06-76RL-01857)
(DE82-015173; UNI-SA-88; CONF-820308-2) Avail: NTIS HC A02/MF A01

A technique for condensing a large amount of reactor operating information into a compact readily comprehensible display to assist the reactor operator with his tasks is described. Safe and efficient operation of a nuclear reactor requires assimilation by the operators of a large amount of information. This information which includes pressure, temperature and flow conditions, rod and valve positions, and power output is usually presented to the operator in analog form on meters, position indicators, or numerically on digital readouts. Compounding the data assimilation problem is the fact that the meters, readouts, and indicators are usually distributed throughout the control room. The plant parameter and instrumentation displays need to be visible, concise, and concentrated such that an operator can readily survey and understand the information and take proper action during a transient event. DOE

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PLANETARY BIOLOGY

Includes exobiology, and extraterrestrial life.

A83-30100
AN INVESTIGATION OF THE ABIOGENIC SYNTHESIS OF PEPTIDES IN A MODEL OPEN SYSTEM [ISSLEDOVANIE ABIOGENNOGO SINTEZA PEPTIDOV V USLOVIIAKH MODEL'NOI OTKRYTOI SISTEMY]
R. F. SYRKU, L. N MOISEEVA, and T. E. PAVLOVSKAIA (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol 268, no 6, 1983, p. 1504-1508 In Russian. refs

The abiogenic synthesis of peptides in a model open system is studied. A homogeneous solution is modeled using phase relations, the isolation of the reaction volume from the external medium, and the creation of flowing reaction conditions A synthetic polymer membrane is exmployed on a base of activated polyolefin with implanted phosphorous groups (phosphorylized), and amino acids of simple structures (glycine, alanine, and serine) are used for the reactions of peptide synthesis. An analysis of the reaction kinetics shows that the peptide synthesis reactions depend on the speed of entry of the substrate from the external medium into the open system It is concluded that this phenomenon is an important factor which arises in processes by which each change in the flow of substrate can evoke changes in the speed of the formation of reaction products In addition, this process establishes a stationary dynamic state in the open system where the inflow of substrate does not occur and constant weights of substrates and reaction products are established N B.

A83-31152
COSMOCHEMISTRY AND THE ORIGIN OF LIFE
C. PONNAMPERUMA (Maryland, University, College Park, MD) IN: Cosmochemistry and the origin of life; Proceedings of the Advanced Study Institute, Maratea, Italy, June 1-12, 1981 . Dordrecht, D Reidel Publishing Co., 1983, p 1-34. refs

The origin of life from prebiotic chemistry is discussed. The raw material from which the building blocks of life evolved, the nature of the primitive atmosphere, the change from that atmosphere to one containing oxygen, and the nature of the energy sources for the synthesis of organic compounds are addressed The prebiotic synthesis of the biological building blocks as studied in the laboratory is considered, including amino acids, purines and pyrimidines, monosaccharides, nucleosides and nucleotides, hydrocarbons and fatty acids The strengths and weaknesses of the various models are assessed. The synthesis of large molecules, including polypeptides, and polynucleotides is discussed The importance of conjugated molecules for life, the development of nucleic acid-protein interactions, the existence of microfossils and molecular fossils, and the evidence of lunar and meteorite samples are addressed C D.

A83-31155* National Aeronautics and Space Administration, Washington, D. C.
IMPACT OF SOLAR SYSTEM EXPLORATION ON THEORIES OF CHEMICAL EVOLUTION AND THE ORIGIN OF LIFE
D. L. DEVINCENZI (NASA, Washington, DC) IN: Cosmochemistry and the origin of life; Proceedings of the Advanced Study Institute, Maratea, Italy, June 1-12, 1981 . Dordrecht, D. Reidel Publishing Co, 1983, p. 143-174. refs

The impact of solar system exploration on theories regarding chemical evolution and the origin of life is examined in detail. Major findings from missions to Mercury, Venus, the moon, Mars, Jupiter, Saturn, and Titan are reviewed and implications for prebiotic chemistry are discussed. Among the major conclusions are: prebiotic chemistry is widespread throughout the solar system and universe; chemical evolution and the origin of life are intimately associated with the origin and evolution of the solar system; the rate, direction, and extent of prebiotic chemistry is highly dependent upon planetary characteristics, and continued exploration will increase understanding of how life originated on earth and allow better estimates of the likelihood of similar processes occurring elsewhere Author

A83-33191* Illinois Univ , Urbana.
AN EXTENSIVE GALACTIC SEARCH FOR CONFORMER II GLYCINE
L E. SNYDER (Illinois, University, Urbana, IL), J. M. HOLLIS, L. W BROWN, D BUHL (NASA, Goddard Space Flight Center, Greenbelt, MD), R. D. SUENRAM, and F. J LOVAS (National Bureau of Standards, Molecular Spectroscopy Div , Washington, DC) Astrophysical Journal, Part 1 (ISSN 0004-637X), vol. 268, May 1, 1983, p 123-128 refs
(Contract NSF AST-79-07830)

The most extensive galactic search reported to date for conformer II glycine, a higher energy form of the simplest amino acid has been conducted The search utilized four glycine transitions at centimeter wavelengths and 21 at millimeter wavelengths to observe 18 galactic molecular sources and one comet. No conformer II glycine lines were detected, and measurements of representative sources were used to compute upper limits on total column densities Several unidentified lines were detected and are reported here with some suggested possible identifications. Author

AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Supplement 248)* AUGUST 1983

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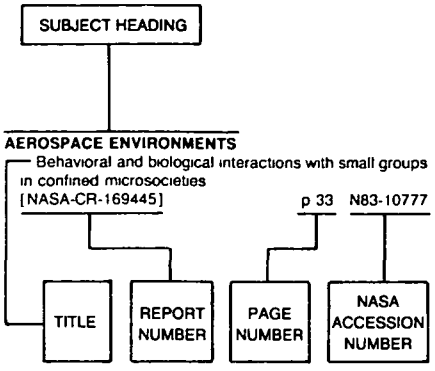

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B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

R

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T

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V

W

X

Y

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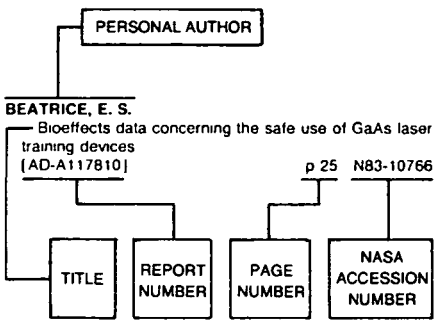

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A

B

C

D

E

F

G

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I

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N

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Q

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U

V

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Y

Z

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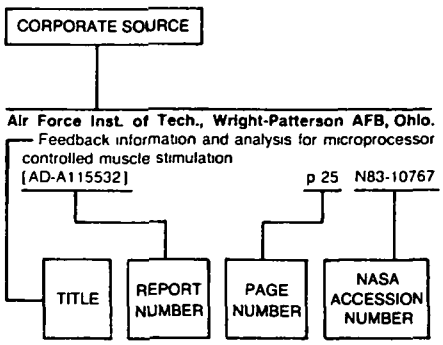

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M

Mannesmann Demag Foerdertechnik, Wetter (West Germany).
Development and trials of a crane cabin in the form of a modern, human working position
[BMFT-FB-HA-82-038] p 298 N83-24179

Marquette Univ., Milwaukee, Wis
Effect of hindlimb immobilization on the fatigability of skeletal muscle p 260 A83-32813

Mason (Virginia) Research Center, Seattle, Wash.
Interaction of anti-G measures and chest wall mechanics in determining gas exchange
[AD-A122297] p 289 N83-25365

Massachusetts Inst. of Tech., Cambridge.
Space motion sickness and vestibular experiments in Spacelab
[SAE PAPER 820833] p 275 A83-30931

Max-Planck-Institut fuer Chemie, Mainz (West Germany).
Biologically mediated isotope fractionations - Biochemistry, geochemical significance and preservation in the earth's oldest sediments p 254 A83-31159

Medical Coll of Virginia, Richmond.
Human sinus arrhythmia as an index of vagal cardiac outflow p 273 A83-30498

Miami Univ , Fla.
Effects of water immersion on plasma catecholamines in normal humans p 271 A83-30465

Miami Univ., Oxford, Ohio.
Physiological and behavioral effects of tilt-induced body fluid shifts p 278 A83-32685

Michigan Univ., Ann Arbor.
Interrelated striated elements in vestibular hair cells of the rat p 247 A83-30022
Design considerations for a real-time ocular counterroll instrument p 297 A83-33108

Modar, Inc., Natick, Mass.
Supercritical water oxidation for wastewater treatment Preliminary study of urea destruction
[SAE PAPER 820872] p 294 A83-30945

Moshman Associates, Inc., Bethesda, Md.
Alternative strategies for developing reliable estimates of national academic basic research expenditures by field of science and engineering
[PB83-132779] p 266 N83-24151

N

National Academy of Sciences - National Research Council, Arlington, Va.
Polar biomedical research An assessment
[PB83-119081] p 286 N83-24170
Polar biomedical research An assessment Appendix Polar medicine, a literature review
[PB83-119099] p 286 N83-24171

National Aeronautics and Space Administration, Washington, D. C.
Impact of solar system exploration on theories of chemical evolution and the origin of life p 300 A83-31155
Changes of nucleic acids of wheat seedlings under spaceflight conditions
[NASA-TM-77200] p 265 N83-24135
Life in motion, in motion!
[NASA-TM-77202] p 265 N83-24136
Aerospace Medicine and Biology A continuing bibliography with indexes
[NASA-SP-7011(244)] p 284 N83-24157
Aerospace Medicine and Biology A cumulative index to the 1982 issues
[NASA-SP-7011(241)] p 286 N83-25347
Space Physiology and Medicine
[NASA-SP-447] p 286 N83-25349

National Aerospace Lab., Amsterdam (Netherlands).
A model of the human decision maker observing a dynamic system
[NLR-TR-81062-U] p 291 N83-24175
An experimental analysis of human monitoring behavior in multivariable failure detection tasks
[NLR-TR-81063-U] p 291 N83-24176

National Bureau of Standards, Washington, D.C.
An extensive galactic search for conformer II glycine p 300 A83-33191

National Cancer Cytology Center, Melville, N.Y.
CO2 homeostasis and carcinogenesis Mammalian response to an increasingly hostile environment p 283 N83-24148

National Research Council of Canada, Ottawa (Ontario).
The prospects for the applied genetic engineering of yeast p 264 N83-23835

Naval Biodynamics Lab., New Orleans, La.
Analysis of sensory evoked potentials using normalized cross-correlation functions and polyexponential regression
[AD-A121726] p 265 N83-24138

Naval Health Research Center, San Diego, Calif.
Salivary and plasma testosterone and cortisol during moderately heavy exercise
[AD-A122107] p 287 N83-25352
L-tryptophan Effects on daytime sleep latency and the waking EEG
[AD-A123633] p 287 N83-25354
Sleep spindle and delta changes during chronic use of a short-acting and a long-acting benzodiazepine hypnotic
[AD-A123149] p 288 N83-25360

Naval Medical Research Inst., Bethesda, Md.
Data acquisition and analysis software for thermal stress studies
[AD-A122567] p 288 N83-25361
Computer-assisted system for determination of O2 consumption and Co2 production in man
[AD-A122525] p 289 N83-25362
Calibrator for an electromagnetically braked bicycle ergometer
[AD-A122511] p 289 N83-25363

Naval Postgraduate School, Monterey, Calif.
Pilot selection criteria for the AH-64 helicopter
[AD-A122495] p 292 N83-25371

Naval Submarine Medical Research Lab., Groton, Conn.
Prolonged low-level CO2 exposure and its effect on kidney calcification p 283 N83-24147

New Hampshire Univ., Durham.
SOYCHMBR I - A model designed for the study of plant growth in a closed chamber
[SAE PAPER 820853] p 253 A83-30941

New York State Dept. of Health, Albany.
Biochemical changes in blood components after lethal doses of radiation
[AD-A121815] p 285 N83-24167

New York Univ Medical Center.
Intracortical interactions for orientation contrast
[AD-A123326] p 287 N83-25353

National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
Drinking and water balance during exercise and heat acclimation p 271 A83-30471
Plasma volume, renin, and vasopressin responses to graded exercise after training p 272 A83-30476
An integrated regenerative air revitalization system for spacecraft
[SAE PAPER 820846] p 293 A83-30937
Plant growth and mineral recycle trade-offs in different scenarios for a CELSS
[SAE PAPER 820855] p 294 A83-30942
A flow-system comparison of the reactivities of calcium superoxide and potassium superoxide with carbon dioxide and water vapor
[SAE PAPER 820873] p 294 A83-30946
Bed-rest studies Fluid and electrolyte responses
[NASA-TM-84357] p 284 N83-24160
A look at motion in the frequency domain
[NASA-TM-84352] p 291 N83-24173
Detection and recognition of simple spatial forms
[NASA-TM-84353] p 291 N83-24174

National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
An extensive galactic search for conformer II glycine p 300 A83-33191

National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
Shuttle Orbiter Atmospheric Revitalization Pressure Control Subsystem
[SAE PAPER 820882] p 293 A83-30927
Metabolic experiments on Spacelab-4
[SAE PAPER 820831] p 275 A83-30929
Fluid and electrolyte homeostasis in space - A primate model to look at mechanisms
[SAE PAPER 820832] p 252 A83-30930
A regenerable solid amine CO2 concentrator for space station
[SAE PAPER 820847] p 294 A83-30938
Thermoelectric integrated membrane evaporation water recovery technology
[SAE PAPER 820849] p 294 A83-30939

National Aeronautics and Space Administration. Pasadena Office, Calif.
System and method for moving a probe to follow movements of tissue
[NASA-CASE-NPO-15197-1] p 286 N83-25346

O

Oak Ridge National Lab., Tenn.
Biological effects of static magnetic fields A selective review with emphasis on risk assessment
[DE82-013350] p 289 N83-25367

Ohio State Univ., Columbus.
Review of pseudoinverse control for use with kinematically redundant manipulators p 295 A83-31075

Oklahoma State Univ., Stillwater
Microbial ecology of extreme environments Antarctic dry valley yeasts and growth in substrate-limited habitats
[NASA-CR-170332] p 266 N83-25343

P

Pennsylvania Univ., Philadelphia.
Human respiration at rest in rapid compression and at high pressures and gas densities p 271 A83-30467
Tolerance and adaptation to acute and chronic hypercapnia in man p 283 N83-24143

Pittsburgh Univ., Pa.
Simulation systems for cognitive psychology
[AD-A123394] p 292 N83-25369

R

Research Inst. of National Defence, Umea (Sweden).
Oral intake of radionuclides in the population A review of biological factors of relevance for assessment of absorbed dose at long term waste storage
[FOA-C-40161-W4] p 285 N83-24162

Rockefeller Univ., New York.
Vestibular-induced vomiting after vestibulocerebellar lesions
[NASA-CR-170276] p 284 N83-24158
Vomiting Center reanalyzed An electrical stimulation study
[NASA-CR-170272] p 284 N83-24159

Royal Aircraft Establishment, Farnborough (England).
The optical detection of air targets and its dependence on environmental, target and observational parameters for ground-to-air and air-to-air observations
[RAE-TRANS-2097] p 291 N83-24172

Rutgers Univ., New Brunswick, N. J
Metabolic effects of CO2 in plant tissues p 265 N83-24142

S

San Jose State Univ., Calif.
Plant growth and mineral recycle trade-offs in different scenarios for a CELSS
[SAE PAPER 820855] p 294 A83-30942
A flow-system comparison of the reactivities of calcium superoxide and potassium superoxide with carbon dioxide and water vapor
[SAE PAPER 820873] p 294 A83-30946

Schaefer (Karl E.), Old Lyme, Conn.
Effect of chronic exposure to low CO2 concentrations on respiration, acid-base balance, and target organs p 283 N83-24146

School of Aerospace Medicine, Brooks AFB, Tex.
Kiel, Johnathan L
[AD-A121792] p 285 N83-24166
Fatigue, workload, and personality indices of air traffic controller stress during an aircraft surge recovery exercises
[AD-A121908] p 286 N83-24168
Ocular thermal injury from intense light
[AD-A122226] p 289 N83-25366

State Univ. of New York, Binghamton.
Fluid and electrolyte homeostasis in space - A primate model to look at mechanisms
[SAE PAPER 820832] p 252 A83-30930

Stuttgart Univ. (West Germany).
Robot control with sensory feedback
[BMFT-FB-HA-82-040] p 298 N83-24180

Systems Research Labs., Inc., Dayton, Ohio
Behavioral and physiological effects of psychological stress in rats
[AD-A123428] p 266 N83-25345
Subsidiary radio communications tasks for workload assessment in R&D simulations 2 Task sensitivity evaluation
[AD-A122545] p 299 N83-25375

SRI International Corp., Menlo Park, Calif.
Man-machine cooperation for action planning
[AD-A124243] p 299 N83-25373

T

U

V

W

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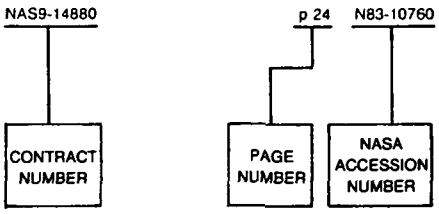

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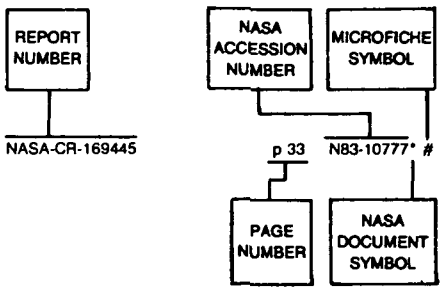

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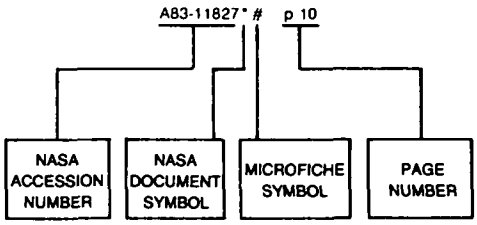

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